IPCC Working Group I Fourth Assessment Report

Expert and Government Review Comments on the Second-Order Draft

Chapter 1

The following compilation of review comments and author responses is supplied by the Working Group I Technical Support Unit as a record of the process used to prepare the Working Group I report. These comments and responses are not to be edited and/ or re-distributed in part or in full to others.

Please note that under IPCC procedures authors are required to take account of all substantive review comments in both review rounds. Thus responses to individual comments may be influenced by comments from other reviewers.

Batch AB (15 June 2006)

No.	Batch	Page:line From	Page:line To	Comment	Notes
1-1	A	0:0	0:	I cannot make out whether this Chapter is supposed to be "historic", and only deal with what happened up to 1998, or is it yet another "Summary", where you bring in the more recent material in the actual Report. For example Figure 1-2 gives a graph of temperature observations to 2006 and projecvtions to 2007 Figure 1-3 and Figure 1_4 also are more recent. Giure 1-4 has one from 2007! Such foresight!. What you say is supposed to be "historic", but you keep referring to the Chapters as if what you say is up-to-date. You never seem to admit that there have been any ddifferences from your "historic" account [VINCENT GRAY (Reviewer's comment ID #: 88-63)]	No change necessary. This chapter serves as an introduction to the rest of the report, and aims at providing elements of context for the entire report. Recent work is not directly treated, but references to subsequent chapters have been made (and updated)
1-2	A	0:0		This chapter is very much appreciated. It might help a lot to improve understanding of a broad range of people. Furthermore it links nicely the key messages included in the main products of the IPCC, thus building confidence in its work. [Govt. of Austria (Reviewer's comment ID #: 2002-42)]	Noted with thanks
1-3	A	0:0		I think this historical overview of the science of CC is a great addition to the AR4, providing general context and information to the lay reader. For myself, I particulary liked section 1.6 on the history of the IPCC itself: very useful and honest perspective. My general comment about the chapter is that it is a bit uneven. Some sections are kept fairly simple and introductory (ex: ENSO) while others are overly technical and demand pretty detailed knowledge from the reader (biochemistry). I don't know how much of this can be remedied at this point, but where I feel some basic explanations are needed I have indicated so. Also some concepts are presented in disorder. Many of my comments are merely editorial and I apologize if they are not requested or needed. [Ileana Blade (Reviewer's comment ID #: 22-1)]	Noted with thanks and taken into account. Due to its interdisciplinary character the text will unevenly be understood by any reader. Modifications for better clarity have been added, although the overall structure of the text as reviewed by the governments has been unchanged.
1-4	A	0:0		1/ Well written and very informative chapter but needs some simplification and/or clarification on the logical link between the part related to observations and modeling [Savitri GARIVAIT (Reviewer's comment ID #: 82-1)]	See answer to question 1-3
1-5	A	0:0		2/ Historical overview of climate change was stated but not key findings, so that we can understand clearly the rationale of scientific community to strengthen effort on investigating climate change. [Savitri GARIVAIT (Reviewer's comment ID #: 82-2)]	Noted
1-6	A	0:0		3/ Perspectives of the overview are missing, especially directions of future R&D based on historical observations. [Savitri GARIVAIT (Reviewer's comment ID #: 82-3)]	Rejected. Defining future R&D is explicitely out of the scope of current chapter
1-7	A	0:0		no comments [Xueliang Guo (Reviewer's comment ID #: 93-1)]	
1-8	A	0:0		Except for section 1.2, this chapter seems superfluous. The ancient history is not directly relevant and it is too early to write the recent history. There is some good stuff in here,	Contradicts other comments and no action can be taken.

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				like Section 1.2 and Fig. 1.1, but it is buried in with a lot of less urgent historical stuff. [Dennis Hartmann (Reviewer's comment ID #: 100-5)]	
1-9	A	0:0		Very useful chapter, and very good having in the report. Also, some figures are really nice and make very useful points, such as the comparison of old projections with observations and global surface temperature change estimates over time. Some sections need updating / coordinating with other chapters. An example is the section on solar forcing, the text here seems to leave the possibility of a large influence of solar forcing on climate quite a bit more open than the respective TAR chapter did (or than we do now) [gabi hegerl (Reviewer's comment ID #: 103-1)]	Taken into account. The formulation concerning solar forcing has been amended.
1-10	A	0:0		References to present chapters should be used more consistently (very detailed in some sections and absent in others) [gabi hegerl (Reviewer's comment ID #: 103-2)]	Accepted. More references to further chapters are included, and more consistency has been pursued.
1-11	A	0:0		There is very little discussion of water vapor feedback in this chapter, yet it is arguably the reason why the global warming problem is as serious as it is (likely increasing the sensitivity of temperatures to CO2 by a factor of 3 or so). Compared to the space devoted to listing a host of subtle aerosol effects and the relatively minor effects of solar forcing, I find this strange. The central role of 1D radiative convective models in our understanding of climate senstivity, the strength of water vapor feedback, and the importance of the top of atmosphere energy balance (as opposed to the surface balance) , helping to justify the concept of radiative forcing, and the seminal work of Manabe in this regard, is not given nearly enough emphasis in this review either. I would go so far as to list it as the modeling breakthrough that, along with the Keeling curve and the ice core CO2 record, basically framed the problem. Until water vapor feedback was quantified I don't think one could say that our conception of the magnitude of the problem was on solid footing. [Isaac Held (Reviewer's comment ID #: 105-8)]	Taken into account only partly. Water vapour feedbacks are treated in details in Chapter 7 of the TAR. While it is difficult to rediscuss it again in the same form in AR4, a reference to this discussion is now provided.
1-12	A	0:0		I find this chapter a little bit too upbeat and would have liked to have seen some introspection about problems with the climate modeling enterprise. These include issues like: big science and the emphasis on results from models that require teams of dozens of scientists to construct, making it difficult for individuals to get their ideas evaluated easily without being part of such a large group; the growing complexity of the models, resulting in the difficulty we have in relating one model to another, the difficulty model A has in taking advantage of the "successes" of model B, and the obselescence and turnover of models that discourages researchers from analyzing them in the kind of detail needed to understand them as scientific objects. I have discussed some of these in Held, I. M., 2005: The gap between simulation and understanding in climate modeling. Bulletin of the American Meteorological Society, 86(11), 1609-1614. I am not fishing for a reference, but I think this essay reflects some angst in the community about where models are going,	Taken into account. The idea of model hierarchy is emphasized in the chapter. The reference to Held (2005) is now included – for the historica l overview it contains. The recommendation for improved future relations between model and theory is out of the scope of the chapter.

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				and I feel that some recognition of these issues in this chapter would provide useful balance. [Isaac Held (Reviewer's comment ID #: 105-9)]	
1-13	A	0:0		I enjoyed reading this Chapter and it forms a useful background to WG1AR4. [David Parker (Reviewer's comment ID #: 195-63)]	Noted with thanks
1-14	A	0:0		Expressions such as "committment" experiments or "stabilization" experiments are misleading the public as experiments are reserved to observations (lab or field). This is bad jargon used by the modeling community and should be discarded because it discredits real experimental obsevations. Computer "experiments" are no experiments in the true sense. They may be called computer runs or performed scenarios, but please NOT experiments. (c.f. SPM-11, lines 47 and 49). In particular, it cannot provide new information on the physical aspects of long term climate change and stabilisation as claimed on line 49/50 of SPM-11!!!! [Michel J. ROSSI (Reviewer's comment ID #: 220-1)]	Misplaced comment
1-15	A	0:0		The historical overview is an excellent idea, and a well-written addition. The links between this chapter and the subsequent chapters, such as on p. 12, line 38, are especially useful. [Franklin SCHWING (Reviewer's comment ID #: 230-2)]	Noted
1-16	A	0:0		One area this is not covered in this historical overview chapter, and is minimally covered elsewhere (e.g., Ch. 7), is the impacts of climate change on ecosystems, and their goods and services. The importance of climate change is in how it affects terrestrial and marine ecosystems, and their consequences to humans. I challenge the next assessment to make this topic its priority, particularly a stronger contribution on marine ecosystems and climate. [Franklin SCHWING (Reviewer's comment ID #: 230-4)]	Rejected. Impacts are covered in IPCC Working Group 2. Reference to the role of biosphere as a component of the climate system is being made.
1-17	A	0:0		This is a thoughtful, engaging, and entirely useful addition to the report. The perspective presented is well grounded in climate science literature and history, and covers as well a few key ideas from the history and philosophy of science. This chapter truly helps provide a context for those that follow and will probably prove to be one of the most studied in educational settings. Kudos on this effort. [Dian Seidel (Reviewer's comment ID #: 231-4)]	Noted with thanks
1-18	A	0:0		The chapter ends in an abrupt manner and lacks a clear, unifying summary. Suggest including such a summary, highlighting the main points of the discussion. Is the Technical Summary intended to do this? If so state clearly and cross-reference. [Govt. of United States of America (Reviewer's comment ID #: 2023-1)]	Taken into account.
1-19	A	0:0		As we progress from history to the present time, Chapter 1 should include linkages to the following Chapters in AR4. Chapter should end with an introduction into the key issues	See answer to comment I-10

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				that inspired research and discussions for the AR4. [Govt. of United States of America (Reviewer's comment ID #: 2023-2)]	
1-20	A	0:0		The historical overview is an excellent and idea, and a well-written addition. The links between this chapter and the subsequent chapters, such as on p. 12, line 38, are especially useful. This was done on this page, but more links to subsequent chapters would be helpful. These not only should appear in the text, but should appear in the summary (to be written). This would provide the reader with a roadmap that connects past work with AR4. Topics could include "Moving beyond the Hockeystick" and "Reconciling surface and upper-air temperature trends". [Govt. of United States of America (Reviewer's comment ID #: 2023-3)]	See answer to 1-
1-21	A	0:0		Overall, a fine chapter which improves the Assessment considerably. It provides new information - and important reminders - for both old and young scientists in "the field". In addition, it serves as important background for non-specialists desiring to understand this Assessment. While many of us may choose one or another reference to serve as benchmarks along the way of climate research hostory, overall the wealth of references in the chapter provides a balanced view of the past accomplishments and lessons learned. A "summery" at the end of chapter 1 might be added to bring the Chapter to closure at this time. [Thomas Vonder Haar (Reviewer's comment ID #: 278-1)]	Noted with thanks and taken into account.
1-22	A	1:0	26:	In Chapter 1, p. 1-26, there appears "Box 1.1: Treatment of Uncertainties in the Working Group I Assessment." A very similar Box "TS.1.1" appears in the TS, p. TS-3. Is the box needed in both places? And, if so, why are there some wording differences between them? [Govt. of United States of America (Reviewer's comment ID #: 2023-4)]	The TS is not a stand-alone document, it can only contain material in the underlying chapters. Hence this table must be in one of the chapters.
1-23	A	1:3	1:13	Replace text with the following: For many decades there has been an awareness and growing understanding of most of the interactive processes in the Earth system that govern climate. . A deeper understanding and quantification of these processes and their incorporation in climate models have progressed rapidly since the First Assessment Report of the IPCC in 1990. As both climate science and the Earth's climate itself have continued to evolve over recent decades, increasing evidence of anthropogenic influences on climate change has been found, leading the IPCC to make increasingly more definitive statements about human impacts on climate. Debate has stimulated a wide variety of climate change research. The results of this research have refined but not significantly revised the main scientific conclusions of the sequence of IPCC assessments. [Govt. of United Kingdom (Reviewer's comment ID #: 2022-1)]	The overview has been modified taking into account some of these suggestions.

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1-24	A	1:10	1:10	I would have complimented the authors for a very fine revision to their chapter even if I had not been added as a contributing author, though I do appreciate that step. [Michael MacCracken (Reviewer's comment ID #: 152-233)]	Noted
1-25	A	1:11		Change Ronald Stouffer to Ronald J Stouffer (or R. J. Stouffer). Please. [Govt. of United States of America (Reviewer's comment ID #: 2023-5)]	Accepted
1-26	A	2:1	2:13	The ES could stress a bit which findings / estimates have remained robust over time. [gabi hegerl (Reviewer's comment ID #: 103-3)]	Noted. This chapter is only providing examples
1-27	A	2:3	2:3	Change "most" to "some". [David Parker (Reviewer's comment ID #: 195-1)]	Rejected as the word partial is already offering the necessary restriction.
1-28	A	2:4	2:6	The exexcutive summary needs some polishing in terms of sentence construction and wording. "A deeper understanding and quantification … have progressed rapidly" does not make sense. Either "A deeper understanding and …. have been achieved" or "Understanding and ... have progressed rapidly". [Ileana Blade (Reviewer's comment ID #: 22-2)]	Yes, we have tried to polish the ES in accord with this and other reviewer comments.
1-29	A	2:4	2:4	Change "predates" to "predate". [David Parker (Reviewer's comment ID #: 195-2)]	YES, this is correct and STILL needs to be fixed in the text.
1-30	A	2:4	2:5	Amend text to "Understanding and quantification of climate processes, and their incorporation in climate models, have…". [David Parker (Reviewer's comment ID #: 195-3)]	Yes, fixed.
1-31	A	2:9	2:9	The IPCC HAS BEEN ABLE TO MAKE increasingly more definitive statements. [Ileana Blade (Reviewer's comment ID #: 22-3)]	Noted, but no direct action taken as the paragraph was rewritten.
1-32	A	2:10	2:10	Add at end "some of which may be related to increased emissions of greenhouse gases" [VINCENT GRAY (Reviewer's comment ID #: 88-22)]	Rejected: the point made in the sentence does concern IPCC ability to appreciate anthropogenic impacts on climate
1-33	A	2:12	2:12	Delete "change". The word has an unfortunate connotation, as it is defined legally by the Framework Convention on Climate Change as restricted to" human activity that alters the composition of the global atmosphere". The IPCC tries to alter this definition by a footnote to the "Summary for Policymakers" (page 3) but this leads to confusion as the public may not notice this and assume that you are referring only to the redtricted FCCC definition. You should therefore avoid using the term"climate change" altogether to avoid this confusion [VINCENT GRAY (Reviewer's comment ID #: 88-23)]	Rejected. The term "climate change" is clearly defined scientifically
1-34	A	3:1	3:3	The chapter starts weakly. It would be useful to have an opening few sentences that interested the general reader in the historical introduction to follow, rather than a bland statement that this kind of survey is not included in earlier reports.	Accepted

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				[Isaac Held (Reviewer's comment ID #: 105-1)]	
1-35	A	3:3	3:3	Change "counterpart" to "precedent". [David Parker (Reviewer's comment ID #: 195-4)]	Yes, this is better and STILL needs to be corrected in the text.
1-36	A	3:6	3:6	Delete "change". The word has an unfortunate commotation, as it is defined legally by the Framework Convention on Climate Change as restricted to" human activity that alters the composition of the global atmosphere". The IPCC tries to alter this definition by a footnote to the "Summary for Policymakers (page 3) but this leads to confusion as the public may not notice this and assume that you are referring only to the redtricted definition. You should therefore avoid using the term"climate change" altogether to avoid this confusion 140 1-140 24 [VINCENT GRAY (Reviewer's comment ID #: 88-4)]	See answer to 1-33
1-37	A	3:6		"illustrate" sounds rather sketchy; how about "identify"? [Richard Allan (Reviewer's comment ID #: 3-1)]	Noted. But "identify" does not correspond to the intention of the chapter, which describes the progress of science in well identified areas.
1-38	A	3:7	3:7	Delete "of the risk of" The study is to find out IF there is a risk at all. You should not assume that there IS a risk [VINCENT GRAY (Reviewer's comment ID #: 88-25)]	Rejected: we think there is no ambiguity in the statement as it is.
1-39	A	3:14	3:14	Delete "change". The word has an unfortunate commotation, as it is defined legally by the Framework Convention on Climate Change as restricted to" human activity that alters the composition of the global atmosphere". The IPCC tries to alter this definition by a footnote to the "Summary for Policymakers" (page 3) but this leads to confusion as the public may not notice this and assume that you are referring only to the redtricted definition. You should therefore avoid using the term"climate change" altogether to avoid this confusion [VINCENT GRAY (Reviewer's comment ID #: 88-26)]	See answer to 1-33.
1-40	A	3:14	3:15	Delete "at an increasingly rapid rat". This is doubtful. Leave it out [VINCENT GRAY (Reviewer's comment ID #: 88-27)]	Rejected This incresingly rapid rate is a major finding of this chapter
1-41	A	3:15	3:15	Delete "change". The word has an unfortunate commotation, as it is defined legally by the Framework Convention on Climate Change as restricted to" human activity that alters the composition of the global atmosphere". The IPCC tries to alter this definition by a footnote to the "Summary for Policymakers" (page 3) but this leads to confusion as the public may not notice this and assume that you are referring only to the redtricted definition. You should therefore avoid using the term"climate change" altogether to avoid this confusion [VINCENT GRAY (Reviewer's comment ID #: 88-28)]	See answer to 1-33
1-42	A	3:15	3:16	Delete the last sentence. It is a gross exaggeration	Accepted

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				[VINCENT GRAY (Reviewer's comment ID #: 88-29)]	
1-43	A	3:15	:16	This last sentence sounds a bit alarmist to me in tone. [gabi hegerl (Reviewer's comment ID #: 103-4)]	Accepted
1-44	A	3:18	5:2	I thought this section was particularly well done. [Michael MacCracken (Reviewer's comment ID #: 152-234)]	Noted with thanks.
1-45	A	3:18	5:2	In this new chapter the very interesting George Philander's ideas presented in his book - PHILANDER, S.G.H.,2004, Our Affair with El Niño: How We Transformed an Enchanting Peruvian Current into a Global Climate Hazzard. Princeton, Princeton University Press-, especially in the chapter 'Big Science versus Small Science', concerning to the great increase of contributions and the Pareto's law for explaining the rate between articles and authors, must be incorporated. [JAVIER MARTIN-VIDE (Reviewer's comment ID #: 165-1)]	Rejected. While we appreciate the reviewer pointing us to a very interesting chapter in Philander's book, Pareto's law is not needed (which addresses article rates by groups of authors) to make the point we are trying to make, namely the increasing rate of papers. While it would be an interesting side note to the section, it is not directly relevant and certainly not necessary. Since we are over space and this point is not necessary, the comment must be rejected.
1-46	A	3:18	5:2	In this new chapter the very interesting George Philander's ideas presented in his book - PHILANDER, S.G.H.,2004, Our Affair with El Niño: How We Transformed an Enchanting Peruvian Current into a Global Climate Hazzard. Princeton, Princeton University Press-, especially in the chapter 'Big Science versus Small Science', concerning to the great increase of contributions and the Pareto's law for explaining the rate between articles and authors, must be incorporated. [Govt. of Spain (Reviewer's comment ID #: 2019-61)]	Rejected. While we appreciate the reviewer pointing us to a very interesting chapter in Philander's book, Pareto's law is not needed (which addresses article rates by groups of authors) to make the point we are trying to make, namely the increasing rate of papers. While it would be an interesting side note to the section, it is not directly relevant and certainly not necessary. Since we are over space and this point is not necessary, the comment must be rejected.
1-47	A	3:18	5:2	The philosophical discussion of the nature of science is very interesting and offers some useful insights. However, the authors should take the further step of trying to define what these characteristics of research might mean to a policymaker trying to extract advice from ongoing scientific research. Authors should consider whether this fits their view of the chapter's goals. [Govt. of United States of America (Reviewer's comment ID #: 2023-6)]	Rejected. In a sense it was accepted because the authors did indeed consider whether it fits in their view of the chapter's goals. But the conclusion was that it does not. It is a big and difficult goal to achieve and beyond the

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					scope of the chapter.
1-48	A	3:18		I like this section on the nature of earth science, found it quite educational. [gabi hegerl (Reviewer's comment ID #: 103-6)]	Noted with appreciation.
1-49	A	3:20	3:20	This is all very well, but there are several contemporary examples of publishe papers in climate science where the original data are not scrutinised or released [VINCENT GRAY (Reviewer's comment ID #: 88-30)]	Rejected. Though it isn't clear exactly what change the reviewer is recommending, the point the reviewer is making is the exception rather than the rule.
1-50	A	3:20	4:56	This is an important and nicely written section. It is buried in the history chapter, which is elsewhere quite dry. The first bit on the nature of scientific inquiry is more important than the history. [Dennis Hartmann (Reviewer's comment ID #: 100-1)]	Noted and rejected. Noted: The compliment towards this section is appreciated. Rejected. The implied recommendation that the section be moved somewhere else (out of the history chapter) isn't possible at this time.
1-51	A	3:21	3:22	Delete some. If a statement is not susceptable to testing and falsification, then it can only be accepted on faith, which is not science. IPCC should not be contributing to any misunderstanding about the nature of science. As pointed out on Pg. 1-4, there are many disciplines of scinece in which controlled experiments cannot be run. However, this does not mean that hypotheses in these disciplines cannot be tested and falsified. [Lenny Bernstein (Reviewer's comment ID #: 20-44)]	Accepted: "some" has been deleted.
1-52	A	3:29	3:30	This quote is present in earlier literature. Please replace with an earlier reference. [Govt. of Australia (Reviewer's comment ID #: 2001-115)]	Rejected. We would accept it if we could, but we just can't find an earlier reference.
1-53	A	3:30		"1988). But…". Should this be "…1988); but.."? [Richard Allan (Reviewer's comment ID #: 3-2)]	Accepted.
1-54	A	3:33	1:34	"ultimately do not survive testing against observations of nature" You are right there. It is about to happen with the theory that increases in greenhouse gases are harmful [VINCENT GRAY (Reviewer's comment ID #: 88-31)]	Noted.
1-55	A	3:37	3:42	"Often" is later contradicted by "occasional". Maybe "sometimes" ? [Ileana Blade (Reviewer's comment ID #: 22-4)]	Accepted.
1-56	A	3:52	:54	What is the point of this sentence mentioning a few unusually gifted scientists? Delete entire sentence. [Govt. of United States of America (Reviewer's comment ID #: 2023-7)]	Accepted
1-57	A	3:57	3:57	Delete "change". The word has an unfortunate commotation, as it is defined legally by the	Rejected. The word "change" is used

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				Framework Convention on Climate Change as restricted to" human activity that alters the composition of the global atmosphere". The IPCC tries to alter this definition by a footnote to the "Summary for Policymakers (page 3) but this leads to confusion as the public may not notice this and assume that you are referring only to the redtricted definition. You should therefore avoid using the term"climate change" altogether to avoid this confusion 148 1-148 32 [VINCENT GRAY (Reviewer's comment ID #: 88-7)]	in a way that is clear and in keeping with generally recognized usage of the English language.
1-58	A	4:3	4:4	"The IPCC assesses the scientific literature etc" but it suppresses any publications which challenge its major propositions. An example is its suppression of the paper by McKitrick and Michaels 2004 "Climate Research Vol 26 159-173 which shows that the surface temperture record is upwardly biased by a range of socioeconomuc factors. The virginity of the surface record is essential to the IPCC argument that "global warming" is caused by greenhouse gas increases, so they refuse to mention this paper or discuss it. It was similarly omitted from the First Draft, and they took no notice of my demand that it should be included. You have confirmed this suppression, and you also try to conceal the fact that methane concentrations in the atmosphere hacve stabilised over the past seven years 149 1-149 33 [VINCENT GRAY (Reviewer's comment ID #: 88-7)]	Rejected. The paper the reviewer cites is too recent to be included in this chapter. But it should be noted that the IPCC assesses the scientific literature. The IPCC does not report on every article, particularly articles that have problems. For example, the research cited by the reviewer looked at changes in temperature versus local economic output. In the world there is more warming in the mid-latitudes than in the tropics. There are clear physical climatic reasons for why this has occurred. But looked at from an economic standpoint where the tropical countries are not doing as well economically as the mid-latitude countries, one can find a correlation. Is that relevant? Could a correlation between observed warming and local conditions also be found for the political systems of the country or for dietary habits of the people? Probably. But it would not likely be relevant to the physics of climate change. Any papers looking at non relevant coincidental factors should probably not be cited by IPCC.
1-59	A	4:4	:6	The role of IPCC reports in stimulating and focusing climate change science is a bit understated here. Scientists are always looking for "official" guidance and vindication of their research. You often see statements in IPCC reports cited on the front end of research	Accepted and rejected. Accepted: The text has been modified to indicate that the IPCC's

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				proposals as justification for the Principal Investigator(s) going after some specific gap in knowledge. This particular sentence should be preceded by another statement that says the following: “While specific research directions are often prescribed by granting agencies, individual scientists exercise considerable latitude in selecting research questions and strategies. After all, science is a competitive enterprise in which detailed proposals are peer-reviewed and ranked by expert panels; the best ideas and most competent research teams normally merit funding. Judging from repeated citations to its findings and recommendations in both research proposals and the scientific literature, the IPCC has stimulated and coordinate targeted research to answer important climate change questions." 70 1-70 8 [Govt. of United States of America (Reviewer’s comment ID #: 2023-7)]	identification of key uncertainties does contribute to guiding future research. Rejected: The actual wording suggested by the reviewer is not quite accurate and is so long it gives undue weighting to that topic, so the actual suggested wording is not used.
1-60	A	4:6	4:6	Delete "change". The word has an unfortunate commotation, as it is defined legally by the Framework Convention on Climate Change as restricted to" human activity that alters the composition of the global atmosphere". The IPCC tries to alter this definition by a footnote to the "Summary for Policymakers (page 3) but this leads to confusion as the public may not notice this and assume that you are referring only to the redtricted definition. You should therefore avoid using the term"climate change" altogether to avoid this confusion 150 1-150 34 [VINCENT GRAY (Reviewer’s comment ID #: 88-7)]	Rejected. The word “change” is used in a way that is clear and in keeping with generally recognized usage of the English language.
1-61	A	4:8	4:10	All that may be true, but why not emphasize the solid physical basis on which climate science is founded. To a climate skeptic, how will we ever know for sure if doubled CO2 really causes global warming if we can't perform a controlled experiment? The authors fail to point out that climate science is an interdisciplinary synthesis of countless tested and proven physical processes and principles painstakingly compiled and verified over several centuries of detailed laboratory measurements, experiments, and theoretical analyses. After all, the whole problem really boils down to, as Bill Clinton might have put it, it is the physics, stupid. Much of what we know and understand in astronomy and cosmology has been learned from laboratory and particle accelerator experiments. [Andrew Lacis (Reviewer’s comment ID #: 138-1)]	Accepted, although some of the recommended addition is placed at the end of the chapter.
1-62	A	4:9	4:10	Of course, there is only one Earth, and there are lots of stars at various life stages, so we even have it harder than the astronomers. [Michael MacCracken (Reviewer’s comment ID #: 152-235)]	Rejected. There is no need to point out that we have it harder than astronomers. Besides, astronomers would disagree that any discipline with in situ observations has it harder than astronomy.
1-63	A	4:10	4:10	that" should be ", which [Ileana Blade (Reviewer’s comment ID #: 22-5)]	Accepted.

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1-64	A	4:12	4:12	Replace “might ideally be required” to “will be required”. This seems obvious. [Govt. of United States of America (Reviewer’s comment ID #: 2023-9)]	Rejected. It is not obvious and may well be unlikely to be totally required.
1-65	A	4:13	4:13	Delete "change". The word has an unfortunate commotation, as it is defined legally by the Framework Convention on Climate Change as restricted to" human activity that alters the composition of the global atmosphere". The IPCC tries to alter this definition by a footnote to the "Summary for Policymakers (page 3) but this leads to confusion as the public may not notice this and assume that you are referring only to the redtricted definition. You should therefore avoid using the term"climate change" altogether to avoid this confusion 151 1-151 35 [VINCENT GRAY (Reviewer’s comment ID #: 88-9)]	Rejected. The word “change” is used in a way that is clear and in keeping with generally recognized usage of the English language.
1-66	A	4:18		Suggest reference to Chapter 8 which uses Mt.Pinatubo to test climate feedbacks [Richard Allan (Reviewer’s comment ID #: 3-3)]	Accepted.
1-67	A	4:19	4:19	Delete "change". The word has an unfortunate commotation, as it is defined legally by the Framework Convention on Climate Change as restricted to" human activity that alters the composition of the global atmosphere". The IPCC tries to alter this definition by a footnote to the "Summary for Policymakers (page 3) but this leads to confusion as the public may not notice this and assume that you are referring only to the redtricted definition. You should therefore avoid using the term"climate change" altogether to avoid this confusion 152 1-152 36 [VINCENT GRAY (Reviewer’s comment ID #: 88-3)]	Rejected. The word “change” is used in a way that is clear and in keeping with generally recognized usage of the English language.
1-68	A	4:20	:23	Figure 1.1 showing the projections in FAR and SAR is very useful. A bit more explanation of this key figure would be useful. For example, why is the SAR startpoint also 1990. Also, t differences in forcing are at related to differences in both projections, why do the SAR projections underestimate the rate of warming, and how do TAR projections compare with all this (could the TAR be shown, also)? The figure shows a point very well making that projections have been broadly robust (quite different from what is sometimes claimed), and that they have been pretty ok over the time of overlap. THis should be given much more prominence in the chapter. [gabi hegerl (Reviewer’s comment ID #: 103-5)]	Accepted and rejected. Accepted: TAR projections since 2000 have been added. Rejected: More discussion about the causes of the differences is off the central topic of evaluating science. We don’t have room to get into that type of detail. And if we did, it would distract from the central message of this part of the chapter.
1-69	A	4:20		Fig 1.1. The explanation in the text of the figure is not clear, the figure reflects the change in yearly averaged temperature respect to a reference period. Whereas in the figure it says "Time evolution in global average atmospheric surface temperature". [Govt. of Spain (Reviewer’s comment ID #: 2019-1)]	Accepted.
1-70	A	4:22	4:23	Replace "actual climate system" by "the upwardly biased surface record, enhanced by a large temperature peak in 1998 attributed to an unusually great El Niño ocean event" [VINCENT GRAY (Reviewer’s comment ID #: 88-37)]	Rejected. The time series can not be biased by actual climate events.

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1-71	A	4:25		Re FIGURE 1.1, the source of the observed values should be quoted - see comment #10. [Adrian Simmons (Reviewer's comment ID #: 242-16)]	Accepted.
1-72	A	4:27	4:38	The paragraph is some how giving interpretation of wrong results for a scientific problems that it is not completly solve, the role of aerosols. It seems a bit tendencious. [Govt. of Spain (Reviewer's comment ID #: 2019-4)]	Rejected. Careful reading reveals that this paragraph is not about the issue of aerosols. It is about one particular simplistic model that projected global cooling based on more aerosols produced by the same factors producing more CO2. It is about scientists responding to legitimate criticism and correcting their analysis.
1-73	A	4:30	4:36	Can residence times alone really resolve this controversy? Surely, if the globally averaged radiative forcing at every point in time were positive, one could not get a global cooling, regardless of residence times. Differences in residence times are, however, highly relevant for regional climate, because they imply that the aerosol radiative forcing is highly inhomogeneous, as opposed to what is the case for long-lived greenhouse gases. [Jón Egill Kristjánsson (Reviewer's comment ID #: 136-1)]	Reject. Yes, resident time alone resolved the controversy related to that one particular simplistic model..
1-74	A	4:37	4:39	Perhaps it should be noted that the peer review process is far from perfect [Richard Allan (Reviewer's comment ID #: 3-4)]	Accepted.
1-75	A	4:45	4:45	Replace "accelerated dramatically" with "increased". Delete "important. Don't overdo it! 154 1-154 38 [VINCENT GRAY (Reviewer's comment ID #: 88-4)]	Rejected. It hasn't just increased it has accelerated dramatically.
1-76	A	4:45	4:47	Equating increasing "complexity" with "advancement" of the science is problematic. Complexity is not a virtue in itself of course; a wider range of capabilities is what is meant I guess [Isaac Held (Reviewer's comment ID #: 105-2)]	Accepted.
1-77	A	4:46		Fig. 1.2. The figure is unclear and it does not have added value to the text in the chapter. May be better to exchange by a table with precise factors or variables included progresively in the models [Govt. of Spain (Reviewer's comment ID #: 2019-2)]	Rejected and accepted. Rejected: The figure is still being used rather than a table. Accepted: But it has been made clearer.
1-78	A	4:49	4:49	Figure 1-2 gives the false impression that the models can predict future behaviour of the sun, It should be omitted [VINCENT GRAY (Reviewer's comment ID #: 88-39)]	Rejected. The models can indeed change the amount of solar energy and the spectrum to adjust for the Maunder Minimum for evaluating historical climate change.
1-79	A	4:51		A better explanation of what is represented in the different panels of Figure 1.2 would help to understand how climate models are getting more and more complex. I think that at	Accepted.

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				least one of the new proccesses included in the models every decade (panels of figure 1.2) should be cited or even explained. [Pedro Ribera (Reviewer's comment ID #: 213-1)]	
1-80	A	4:53	4:53	Delete "change". The word has an unfortunate commotation, as it is defined legally by the Framework Convention on Climate Change as restricted to" human activity that alters the composition of the global atmosphere". The IPCC tries to alter this definition by a footnote to the "Summary for Policymakers (page 3) but this leads to confusion as the public may not notice this and assume that you are referring only to the redtricted definition. You should therefore avoid using the term"climate change" altogether to avoid this confusion 156 1-156 40 [VINCENT GRAY (Reviewer's comment ID #: 88-1)]	Rejected. The word "change" is used in a way that is clear and in keeping with generally recognized usage of the English language.
1-81	A	4:55	4:55	Delete "change". The word has an unfortunate commotation, as it is defined legally by the Framework Convention on Climate Change as restricted to" human activity that alters the composition of the global atmosphere". The IPCC tries to alter this definition by a footnote to the "Summary for Policymakers (page 3) but this leads to confusion as the public may not notice this and assume that you are referring only to the redtricted definition. You should therefore avoid using the term"climate change" altogether to avoid this confusion 157 1-157 41 [VINCENT GRAY (Reviewer's comment ID #: 88-1)]	Rejected. The word "change" is used in a way that is clear and in keeping with generally recognized usage of the English language.
1-82	A	5:0	10:	Harries et al. (2001) Nature 410 p.355-357 provided evidence from satellite data for a significant increase in the Earth's greenhouse effect over the period 1970-1997. This should be referenced in this chapter (e.g. the end of 1.3.1 or 1.4.1). [Richard Allan (Reviewer's comment ID #: 3-6)]	Rejected, Not enough space to rewrite the section, although a reasonable point.
1-83	A	5:4	9:14	The discussion in Section 1.3 is much improved over the first-order draft. However, it still fails to acknowledge any drawbacks in the IPCC process. The IPCC has achieved tremendous progress. However, the process of consensus and Government approval generally leads to a "lowest common denominator" product. Also, the timelines are such that products are often dated almost before they are published. For example, although the Aviation and the Global Atmosphere report quoted was published in 1999, the process is such that the final product was based on early to mid-1990s research. Given the scientific advances in the last decade, many of the findings are now dated. However, in the absence of a new consensus report, the 1999 report continues to exert substantial influence, even though arguably its relevance is diminishing. Making these points will provide important context for policymakers. [Govt. of United States of America (Reviewer's comment ID #: 2023-10)]	Rejected, this point is fairly covered in the whole report.
1-84	A	5:6	5:6	Replace "fingerprint" by "influence on" Let's use proper scientific language	Rejected, correct as is

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				[VINCENT GRAY (Reviewer's comment ID #: 88-42)]	
1-85	A	5:7	5:7	You fail to mention the main greenhouse gas, water vapour, and the possibilities that humans might influence it. And I do not want to hear the excuse that you ignore it because it is a "feedback" Feedback or not, it is still the most important greenhouse gas and you should discuss its influence on the climate [VINCENT GRAY (Reviewer's comment ID #: 88-44)]	Rejected, correct as is, please read the title carefully.
1-86	A	5:8	1:8	Delete "high accuracy". I deplore your theatrical style. This is supposed to be science, not public relations propaganda [VINCENT GRAY (Reviewer's comment ID #: 88-45)]	Rejected, correct as is
1-87	A	5:8	5:19	This whole paragraph is a public relations puff for Keeling. It fails to mention that Mauna Loa is not representative of the whole earth, and since carbon dioxide is not a "well-mixed" gas (as proved by the "rug" suppiued by the NOAA, and by the difficulties of measurement over land) we do not have a fair average for the concentration of carbon dioxide in the erath's atmosphere. Almost all the measurements are over the ocean. Since the concern for the effects of carbon dioxide are by humans living on land, we simply do not know what the concentrations are over land. The same considerations apply to methane. [VINCENT GRAY (Reviewer's comment ID #: 88-43)]	Rejected, correct as is
1-88	A	5:9	5:10	Delete from "the master time series" on line 9 to "climate change science as" on line 10. We don't need this hyped style. [VINCENT GRAY (Reviewer's comment ID #: 88-46)]	Taken into account, sentence revised, but phrase has been kept as it is correct.
1-89	A	5:10	5:10	Is 1998 the last reference to CO2 concentrations? I thought we lived in 2006 [VINCENT GRAY (Reviewer's comment ID #: 88-57)]	Noted, using publications prior to TAR for new science.
1-90	A	5:12	5:13	Delete from "the master time series" on line 9 to "climate change science as" on line 10. We don't need this hyped style. [VINCENT GRAY (Reviewer's comment ID #: 88-47)]	Rejected, correct as is
1-91	A	5:12	5:15	Delete from "are unique" on line 12 to "clearly" on line 15. This is exaggeration. Keeling's measurements are not unique. There are many others. They do not measure fossil fuel burning. They measure carbon dioxide concentration. [VINCENT GRAY (Reviewer's comment ID #: 88-48)]	Rejected
1-92	A	5:12		The fact that mixing in the atmosphere allows extrapolation of the Mauna Loa point results to a global perspective should be made here. [Govt. of United States of America (Reviewer's comment ID #: 2023-11)]	Taken into account
1-93	A	5:18	5:18	Replace "uniquely identify" with "relate" Replave "with" with "to"1 [VINCENT GRAY (Reviewer's comment ID #: 88-49)]	Rejected, correct as is
1-94	A	5:21	5:21	Replace "Although" with "To place"	Accepted

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				[VINCENT GRAY (Reviewer's comment ID #: 88-50)]	
1-95	A	5:21	5:21	Replace "may appear dramatic" by "in perspective" [VINCENT GRAY (Reviewer's comment ID #: 88-51)]	Accepted
1-96	A	5:22	5:22	Replace "perspective" by "record" [VINCENT GRAY (Reviewer's comment ID #: 88-52)]	Accepted
1-97	A	5:22	5:22	Add at end "supposed" [VINCENT GRAY (Reviewer's comment ID #: 88-53)]	Rejected, correct as is
1-98	A	5:23	5:24	Reliable CO2 data come only from Antarctic: we suggest to suppress the mention of Greenland [Govt. of France (Reviewer's comment ID #: 2010-2)]	Rejected, correct as is since it refers to CH4 also. Now more clearly written.
1-99	A	5:23	5:23	Replace ", The necessary data came" with "which has come" [VINCENT GRAY (Reviewer's comment ID #: 88-54)]	Taken into account, this has been fixed differently.
1-100	A	5:25	5:26	The fact that CO2 abundances were significantly lower during the last ice age was also published in 1982 by Delmas et al. (1982) in Nature; We suggest to add this reference before Neftel et al., 1982 [Govt. of France (Reviewer's comment ID #: 2010-3)]	Accepted, 2 new references added.
1-101	A	5:25	5:25	Delete "significantly" [VINCENT GRAY (Reviewer's comment ID #: 88-55)]	Rejected, correct as is
1-102	A	5:26	5:26	Delerte "roughly exponentially". What, exactly, does that mean? [VINCENT GRAY (Reviewer's comment ID #: 88-56)]	Rejected, believe that this is clear.
1-103	A	5:27	5:27	The CO2 concentration (line 27: 367 ppm in 1999), are now out of date. An effort should be made to bring them up to date (380 ppm in 2005 ?), even if that involves using CDIAC data from the internet rather than published papers. More recent results are quoted in Ch. 2 [Govt. of France (Reviewer's comment ID #: 2010-4)]	Accepted
1-104	A	5:27	5:27	Given the time span of the preparation of this report, it is understandable that some of the once most recent figures, e.g. the CO2 concentration (367 ppm in 1999), are now out of date. An effort should be made to bring them up to date (380 ppm in 2005 ?), even if that involves using CDIAC data from the internet rather than published papers. I note that more recent results are quoted in Ch. 2. [Robert Kandel (Reviewer's comment ID #: 123-2)]	ditto
1-105	A	5:28	5:28	Replace "not exceeded about 20 ppmv" by "varied only slightly" Let us not use the language of TV advertisements [VINCENT GRAY (Reviewer's comment ID #: 88-58)]	Rejected, correct as is
1-106	A	5:28	5:28	I suggest adding '+/-' in front of 20 ppm. [Jón Egill Kristjánsson (Reviewer's comment ID #: 136-2)]	Accepted

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1-107	A	5:28	5:29	Insert "natural" before "variations" and move the whole sentence to before the previous one. [David Parker (Reviewer's comment ID #: 195-5)]	Accepted
1-108	A	5:32	5:32	Insert after "oxide)." were also taken from unrepresentative ovean locations and , at" 175 1-175 59 [VINCENT GRAY (Reviewer's comment ID #: 88-5)]	Rejected, correct as is
1-109	A	5:32		Suggest removing "…first detected their increasing abundances. These measurements…" since this is interupts the flow. [Richard Allan (Reviewer's comment ID #: 3-5)]	Accepted
1-110	A	5:36	5:36	Insert after (2003) and, since 1999 the concentration has been constant, and likely to fall" 176 1-176 60 [VINCENT GRAY (Reviewer's comment ID #: 88-5)]	Taken into account – have revised to reflect slowdown and possible stabilization of abundance
1-111	A	5:42	5:42	A better high end concentration for methane is 790 ppb. This is based on the Vostok core (Spahni et al., 2005 - see Chapter 6 for complete reference). Although this higher value is a single measurement at MIS 9.3 made on the Vostok ice core, there is not evidence to ignore it. [Bette Otto-Bliesner (Reviewer's comment ID #: 193-5)]	Rejected – a single late measurements may not be correct or representative of the CH4 range.
1-112	A	5:43	5:43	Add after "cycles" ,", but has now stabilised at 1750ppbv" [VINCENT GRAY (Reviewer's comment ID #: 88-61)]	Taken into account – see #110
1-113	A	5:43	5:43	Add after "emissions", "but cannot explain why it has stabilised" [VINCENT GRAY (Reviewer's comment ID #: 88-62)]	Taken into account – the bulk of this must belong in the Chapter 2
1-114	A	5:49	5:49	There should be a reference to where the Greenhouse Warming Potentials are defined. [Govt. of France (Reviewer's comment ID #: 2010-5)]	Accepted
1-115	A	5:49	5:49	There should be a reference to where the Greenhouse Warming Potentials are defined. [Robert Kandel (Reviewer's comment ID #: 123-3)]	ditto
1-116	A	5:55	5:55	has shown THAT, WITH ONE EXCEPTION, these compounds …. [Ileana Blade (Reviewer's comment ID #: 22-6)]	Taken in account – fixed slightly differently
1-117	A	6:1	6:1	Delete "well-mixed" This is a myth. They are not "well-mixed". Even the biased series at present only measured over the oceans shows a definite change with latitude (see NOAA website) but there would be much greater variability if measuremments over land could be made [VINCENT GRAY (Reviewer's comment ID #: 88-64)]	Rejected, correct as is
1-118	A	6:7	7:22	Some of this history seems a bit irrelevant and long-winded. Can this section be shortened? [Dennis Hartmann (Reviewer's comment ID #: 100-2)]	Rejected. An attempt was made to shorten this section without deleting important details in this history of global temperature time series. This

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					resulted in too little being removed to be able to say accepted. It should be noted that this version is shorter than the zeroth order draft or the first order draft.
1-119	A	6:8	6:8	Change "Kingston" to "Kington" here and in the bibliography. [David Parker (Reviewer's comment ID #: 195-6)]	Accepted.
1-120	A	6:13	6:13	There is no such thing as "modelling" evidence! All the evidence comes from lab or field. The computer guides the experiments but can in and by itself not generate observational evidence. This is probably the point I insist the most in order to protect the public from misunderstandings of what models can or cannot do. [Michel J. ROSSI (Reviewer's comment ID #: 220-3)]	This comment is misplaced as it is not relevant to Chapter 1 page 6.
1-121	A	6:15	6:16	Ament text to "…in 1873. Its successor, the World Meteorological Organization (WMO), formed in 1950, still works…". [David Parker (Reviewer's comment ID #: 195-7)]	Accepted.
1-122	A	6:20	6:20	Amend text to "…areal averaging in the presence of substantial gaps". [David Parker (Reviewer's comment ID #: 195-8)]	Accepted.
1-123	A	6:22	6:22	Replace "most" by "some" No need to exaggerate [VINCENT GRAY (Reviewer's comment ID #: 88-65)]	Rejected. There are four items (data, qc, homogeneity and area averaging) and Koeppen addressed three of them: data, qc and area averaging. Therefore most is more accurate than some.
1-124	A	6:22	6:22	Replace "near global" by "extensive". Here you go again! None of the netwoks of weathert stations past or present comes remotely near to a randomly distributed series. ALL averages are therefore automatically biased until such a network is available, or until a correction procedure can be found.. Satellitrte surveys, by contrast, can derive truly global averrasges [VINCENT GRAY (Reviewer's comment ID #: 88-66)]	Rejected. One of the major reasons for area averaging is to extend the amount of the globe considered. Koeppen's approach allowed him to make an assessment for nearly the whole globe.
1-125	A	6:24	6:24	change "large-scale" to "external" ? [Ileana Blade (Reviewer's comment ID #: 22-7)]	Rejected. The reviewer's suggestion would be accurate but it would loose the sense that non-global scale forcing can be assessed by mean global temperatures. An example of that would be volcanic aerosols which primarily directly impact a wide latitude band but in so doing indirectly impact global temperatures.

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1-126	A	6:24	6:24	Insert before "global" Apparent" 183 1-183 67 [VINCENT GRAY (Reviewer's comment ID #: 88-7)]	Rejected. Mean global temperature is a well defined, commonly used term. Rather than apparent we could add anomaly instead but that would just unnecessarily make the statement more complex.
1-127	A	6:24	6:25	Amend text to "Later he identified quasi-decadal fluctuations in global temperature (Köppen, 1880, 1881; see also Figure 1.3)" and move the sentence to the end of the paragraph. [David Parker (Reviewer's comment ID #: 195-9)]	Rejected. Initially accepted but then later the whole sentence was removed to make the section shorter.
1-128	A	6:26	8:26	Insert after "climate change" "(defined to include all forms of change)" [VINCENT GRAY (Reviewer's comment ID #: 88-79)]	Rejected. This addition is unnecessary and would make the section longer. (The comment is mislocated as it should be for line 8:26 to 8:26.)
1-129	A	6:28	6:29	Amend text to "…100 stations, Köppen (1873) averaged annual observations from 1820 to 1971 into several major latitude belts and then area-averaged these into near-global time series." [David Parker (Reviewer's comment ID #: 195-10)]	Accepted.
1-130	A	6:31	6:31	"replace "global" with "near-global" 184 1-184 68 [VINCENT GRAY (Reviewer's comment ID #: 88-10)]	Rejected: Callendar (1938) called his time series global (actually "for the earth") due to area averaging.
1-131	A	6:36	6:36	"replace "global" with "near-global" 185 1-185 69 [VINCENT GRAY (Reviewer's comment ID #: 88-10)]	Rejected: Callendar (1938) called his time series global (actually "for the earth") due to area averaging.
1-132	A	6:46	6:46	"replace "global" with "near-global" 186 1-186 70 [VINCENT GRAY (Reviewer's comment ID #: 88-10)]	Rejected. Willett (1950) called his time series global (actually "world") due to area averaging.
1-133	A	6:56	6:56	"replace "global" with "near-global" 187 1-187 71 [VINCENT GRAY (Reviewer's comment ID #: 88-10)]	Accepted.
1-134	A	7:2	7:2	"replace "global" with "near-global" 188 1-188 72 [VINCENT GRAY (Reviewer's comment ID #: 88-10)]	Rejected. Mitchell (1963) called his time series global (actually "world") due to area averaging.
1-135	A	7:8	7:8	Change "that approach" to "whose approach" [Michael MacCracken (Reviewer's comment ID #: 152-236)]	Accepted. However, while "that approach" is no longer in the text, the sentence has been rewritten a different way than the reviewer recommended.

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1-136	A	7:14	:22	Would it be useful to spell out in more detail which datasets are homogenized by adjusting the data, and which exclude suspect data but leave the other datasets unaltered? [gabi hegerl (Reviewer's comment ID #: 103-7)]	Rejected. The reviewer's suggestion is too detailed for this overview, which need to be shortened.
1-137	A	7:22	7:22	Add at end "This procedure is only possible where there are large numbers of weather stations for comparison purposes. So far full "homogeneity adjusted" records have only been published for the continental USA, and for China. In both cases the "adjusted" records show little oerall warming for the past century, suggesting that this might be true for the entire near-global set. It might also be mentioned that the wholesale closing down of weather stations worldwide since 1987 has probably biased the average, as they would have been predominantly rural" [VINCENT GRAY (Reviewer's comment ID #: 88-73)]	Rejected. The reviewer is correct that this procedure doesn't work well when there are no stations near by. But example stations like that are few. Saint Helena Island is one of them. So the impact of the first part of the reviewer's comment is minor. For the second part, a bias due to closing of rural stations, analysis has shown that not to be true. Yes there is a decrease in the number of stations in global data sets in recent years, but that is less due to closing than to delay in data exchange. Analysis of global rural and full data set trends indicate the results are quite similar so there is no long-term bias. Analysis of two different approaches to recent data, the anomaly method and the First Difference method, shows little difference in the end result. This would not be the case if the reviewer's comment was correct.
1-138	A	7:27	7:28	The inclusion of this statement contradicts the methodological material on pages 1-3 to 1-4. The claim that there is only negligible nonclimatic contamination of surface temperature data is a hypothesis. It was tested in McKitrick and Michaels (2004) and deLaat and Maurellis (2004) and convincingly rejected in each case, using independent data and methods. The Jones and Peterson papers are quite old and do not provide counterevidence overturning any of the results in M&M of dL&M. [Ross McKitrick (Reviewer's comment ID #: 174-1)]	Rejected. The Jones and Peterson papers are old and that is one of the reasons we cite them. Our mandate is to not present material such as McKitrick and Michaels (2004) which is after the TAR. Those papers would be addressed by later chapters in AR4. Indeed, Chapter 3 addressed this concern explicitly by stating: McKitrick and Michaels (2004) and De Laat and Maurellis (2006) attempted to demonstrate that geographical patterns of warming trends over land are

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					strongly correlated with geographical patterns of industrial and socioeconomic development, implying that urbanisation and related land-surface changes have caused much of the observed warming. However, the locations of greatest socioeconomic development are also those which have been most warmed by atmospheric circulation changes (Sections 3.2.2.7 and 3.6.4) which exhibit large-scale coherence. Hence the correlation between warming and industrial and socioeconomic development ceases to be statistically significant. In addition, observed warming and transient greenhouse-induced warming is expected to be greater over land than over the oceans (Chapter 10), owing to the smaller thermal capacity of the land.
1-139	A	7:27	7:28	Jones (1990) should not be cited here, and certainly not in support of the claim that it rules out a global imprint of urbanization effects on temperature data. First, the paper is 15 years old, and refers to data sets that are not the ones used in the AR4. Second, Jones 1990 only examines the US, the western USSR, eastern Australia and eastern China; hardly a global or even hemispheric sample. Third, it proves the opposite of the assertion being made, since the evidence presented in the paper all points to differential urban-rural trends that dominate the regions. In the USSR data they say: "Over the 1930-1987 period, a cooling of ~0.2 C in RUSSR [rural series] is observed. This cooling is about 0.1 C smaller in JUSSR [combined rural-urban], but there are no statistically significant differences between the two series." (p.171). For eastern China they say: "The warming in UCHI [urban series] is 0.39C, considerably higher than that in RCHI [rural series]. For this region, UCHI is the only series for which warming is staistically significnat." (pp. 171-172). For eastern Australia they find similar warming in the rural and urban series, though they define "rural" as up to 33,368 persons. For the US they report earlier findings of a significant (0.15C) urban warming bias. Yet in both the abstract and the conclusion of their paper, they assert that their results provide little or no evidence of urbanization bias,	Rejected. The question that needs to be addressed is not whether some rural stations are showing less warming (or more cooling) than some urban stations but whether the global temperature time series are biased warm by the presence of urban stations. The reviewer's comments are not directed towards this question. While the reviewer is accurate in the extraction of a subset of numbers, the numbers not mentioned prove the reviewer's point is wrong. Take Russia for example. Yes rural Russia had a trend of -0.21 while urban was -0.09. Does this indicate an urban bias in global gridded datasets? No

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				a statement directly contradicted by their own evidence. They suggest that urbanization represents at most 0.05 C of the observed 0.5 C warming over the entire century, with no quantitative basis whatsoever. The 0.05 figure is not calculated anywhere in the paper, it is an off-the-cuff guess about the maximum that might be observed in key areas of the world they did not examine, i.e. Europe and the tropics (p. 172). Despite finding an urban warming bias everywhere but eastern Australia they assert that "In none of the three regions studied here is there any indication of significant urban influence" and "The United States result therefore does seem somewhat atypical compared with other industrialized regions of the world" (p. 172). This latter statement is particularly misleading since their ad hoc sample of eastern China, eastern Australia and the western USSR hardly constitute the "industrialized regions of the world" outside the US. Quoting their "spun" conclusion while ignoring the paper's own evidence is deceptive to IPCC readers. If you want to refer to Jones (1990) then quote it accurately: it provides evidence that urban influences on temperature data do show up in several regions including the US, China and the Russia, and it provides no evidence that these influences are small in the global average. 341 1-341 2 [Ross McKitrick (Reviewer's comment ID #: 174-1)]	1because the number the reviewer did not list was that the Russian area from the global gridded data set which had a trend of -0.20. Take China. Yes the reviewer is correct that urban China was warming faster than rural China but again the reviewer did not mention that the global gridded dataset area for China was warming even less than the rural. The same is true for Australia. Ergo, this comment is rejected. While the reviewer indicates that the paper's own evidence is ignored by the IPCC in the "spun" conclusion, it would be more accurate to state that this reviewer not presenting the numbers from the global gridded data set is actually ignoring evidence and thereby spinning conclusions not represented by the paper.
1-140	A	7:27	7:28	Sources cited: McKitrick, R and P. J. Michaels (2004). "A Test of Corrections for Extraneous Signals in Gridded Surface Temperature Data" Climate Research 26(2) pp. 159-173. "Erratum," Climate Research 27(3) 265—268; de Laat, A. T. J. and A. N. Maurellis. (2004) "Industrial CO2 emissions as a proxy for anthropogenic influence on lower tropospheric temperature trends." Geophysical Research Letters, VOL. 31, L05204, doi:10.1029/2003GL019024, 2004. [Ross McKitrick (Reviewer's comment ID #: 174-3)]	Rejected. Our mandate is to not present material such as McKitrick and Michaels (2004) which is after the TAR. Those papers would be addressed by later chapters in AR4. Indeed, Chapter 3 addressed this concern explicitly by stating: McKitrick and Michaels (2004) and De Laat and Maurellis (2006) attempted to demonstrate that geographical patterns of warming trends over land are strongly correlated with geographical patterns of industrial and socioeconomic development, implying that urbanisation and related land-surface changes have caused much of the observed warming. However, the locations of greatest socioeconomic

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					development are also those which have been most warmed by atmospheric circulation changes (Sections 3.2.2.7 and 3.6.4) which exhibit large-scale coherence. Hence the correlation between warming and industrial and socioeconomic development ceases to be statistically significant. In addition, observed warming and transient greenhouse-induced warming is expected to be greater over land than over the oceans (Chapter 10), owing to the smaller thermal capacity of the land.
1-141	A	7:28	7:28	Also Parker (2004). "Climate: Large-scale warming is not urban". Nature 432: 290. [Ileana Blade (Reviewer's comment ID #: 22-8)]	Rejected. Paper cited is post TAR and is addressed in Chapter 3.
1-142	A	7:28	7:28	Add at end. "This conclusion, though, only applies after "homogenieity adjustment" and was found only for the USA… 190 1-190 74 [VINCENT GRAY (Reviewer's comment ID #: 88-8)]	Rejected. After citing two global papers it is inappropriate to say that this applies only to the USA. It is unnecessary to mention homogeneity adjustments as all global datasets now have homogeneity adjustments as stated earlier in the text.
1-143	A	7:28		The discussions in Chapters 1 and 3 are not detailed enough to do the urban heat island effect justice. Needs a more organized discussion about the questions raised and how addressed/resolved. For example, one of the main findings in Chapter 3 is that there have been increases in the extremes of temperatures, which are consistent with global warming. In an analysis of Australian and Argentine temperatures, Camilloni and Barros (1997) showed that interannual variability of temperature is generally lower in urban environments than in rural areas; in other words, urban stations are prone to have lower trends in absolute value than rural ones. Could the trend in temperature extremes globally simply reflect a disproportionate increase of rural stations globally over time? The scientific consensus is that in a global analysis, such biases all tend to come out in the wash. Consider merit of including Camilloni and Barros findings to the discussion. [Govt. of United States of America (Reviewer's comment ID #: 2023-12)]	Rejected. The merit of Camilloni and Barros (1997) was considered but the paper was not added as the focus was on long-term trends rather than differences in variability. As pointed out by an earlier reviewer comment (1-137), the exact opposite of the reviewer's hypothesis is happening: there is a decrease in the fraction of rural stations going into global temperature analyses in recent years. This section describes how potential urban heat islands were addressed in the past. The responsibility for

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					adequately explaining how they are currently addressed lies with Chapter 3.
1-144	A	7:37	7:37	Delete "significant". In science this is usually associated with statistical methods [VINCENT GRAY (Reviewer's comment ID #: 88-75)]	Accepted. Significant replaced by major.
1-145	A	7:37	7:45	For reasons relating to how we believe and interpret the 20th century climate record, I think this paragraph needs to have a sentence or two about the problems that arose during WWII, when not only the method of measuring SST was changing (to intake temperature) but when there were all sorts of other problems. For example, it is my understanding that nighttime marine air temperatures had to undergo quite significant adjustments (like 2 C) due to the change in how measurements were made (near wheelhouse instead of bow of ship). In addition, the spatial coverage of observations changed (particularly over the oceans), observers changed, etc. It is likely very hard to go back and reconstruct what happened for each observations, but what seems clear is that the uncertainty about the measurements should generally be higher than for periods since (and before). This issue of uncertainty during the WWII period is important because that is said to be when there was a warming peak--and it is really strange that right after the end of the war there was a sudden return to a different situation. In my view we should be very suspicious of this change--and it is likely due to problems during WWII. I find it very interesting--and disturbing--that if one were to simply drop out the observations from during the war years, one would have a quite different impression of the 20th century temperature record, something that is true only for that period. It seems to me that this chapter having one example of where science is a bit stymied with past observations, rather than them always improving over time, might be useful. [Michael MacCracken (Reviewer's comment ID #: 152-237)]	Rejected. Much of the point made by the reviewer is correct. The problem is that (a) this section is already too long and addressing the reviewer's comment adequately would be quite lengthy, (b) addressing them in passing would be confusing but in detail would overweight this concern, and most importantly (c) some of the solutions to this problem have been applied since the TAR. Therefore it should be covered by later chapters.
1-146	A	7:45	7:45	Add at end "US workers have never accepted that this method is sufficiently reliable to incorporate such measurements in a global average.. Christy et al 2001 Geophysical Research Letters Vol 28 pages 183-186 have shown that the transition from measurements in buckets drawn from the sea to measurement in the engine intake introduces an upwards bias which, so far, has not been corrected" 192 1-192 76 [VINCENT GRAY (Reviewer's comment ID #: 88-237)]	Rejected. First off, the Christy MSU air temperature, particularly in the tropics, has been corrected since the cited paper came out (they had an error in their adjustment for diurnal drift). Secondly, the relevant US SST work ("US workers have never accepted that this method is sufficiently reliable …") is too recent for this section and should be addressed by AR4 Chapter 3. It should be noted, though, that the US statistical approach produces results quite similar to the method questioned

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					by the reviewer. And lastly, there may well be a bias in the data in recent years but it is most likely a cold bias as very recent work has indicated that buoys are reading colder than ships.
1-147	A	7:51	7:51	Insert after " 1998)". "Christy et al 193 1-193 77 [VINCENT GRAY (Reviewer's comment ID #: 88-237)]	Rejected. That reference is not necessary.
1-148	A	7:51		Should also include Argo floats, which provide SST observations with over 2000 now deployed. Change "several hundred" to "several thousand". [Govt. of United States of America (Reviewer's comment ID #: 2023-13)]	Rejected and accepted. Argo floats can not be included because, despite plans, they do not take SST measurements (the sensor is turned off near the surface to prevent biological contamination). In March of 2004, the number of buoys had increased to 909 drifters and in 2005 reached its target of 1250 drifting buoys. There are also 82 moored buoys. So it is partly accepted in that the old several hundred term is clearly out of date and has been replaced with "over a thousand".
1-149	A	7:52	7:52	insituinsitu [Stefan Brönnimann (Reviewer's comment ID #: 30-1)]	Accepted.
1-150	A	7:52	7:52	Amend typo where "in situ" is repeated. [David Parker (Reviewer's comment ID #: 195-11)]	Accepted.
1-151	A	7:52	7:52	in situin situ" -> "in situ [Pedro Ribera (Reviewer's comment ID #: 213-2)]	Accepted.
1-152	A	7:52		repeat of "in situ" [Richard Allan (Reviewer's comment ID #: 3-7)]	Accepted.
1-153	A	7:52		Typo: In situin situ should just be in situ [Govt. of United States of America (Reviewer's comment ID #: 2023-14)]	Accepted.
1-154	A	8:3		Fig. 1.3. As in comment 1 for Fig. 1.1 the text is not clear for the same reason. [Govt. of Spain (Reviewer's comment ID #: 2019-3)]	Accepted. The text describing the figure and the figure caption have been clarified and harmonized.
1-155	A	8:10	8:10	Add at end "But does not alter the fact that the average is greatly influenced by proximity to human habitation (see McKitrick and Michaels 2004 Climate Research Vol 26 pages 159-173) 194 1-194 78	Rejected. Our mandate is to not present material such as McKitrick and Michaels (2004) which is after the

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				[VINCENT GRAY (Reviewer's comment ID #: 88-3)]	TAR. Those papers would be addressed by later chapters in AR4. Indeed, Chapter 3 addressed this concern explicitly by stating: McKitrick and Michaels (2004) and De Laat and Maurellis (2006) attempted to demonstrate that geographical patterns of warming trends over land are strongly correlated with geographical patterns of industrial and socioeconomic development, implying that urbanisation and related land-surface changes have caused much of the observed warming. However, the locations of greatest socioeconomic development are also those which have been most warmed by atmospheric circulation changes (Sections 3.2.2.7 and 3.6.4) which exhibit large-scale coherence. Hence the correlation between warming and industrial and socioeconomic development ceases to be statistically significant. In addition, observed warming and transient greenhouse-induced warming is expected to be greater over land than over the oceans (Chapter 10), owing to the smaller thermal capacity of the land.
1-156	A	8:10	8:10	Amend text to "…the changes they are indicating since 1900 are real". [David Parker (Reviewer's comment ID #: 195-12)]	Accepted.
1-157	A	8:25	:34	The definition of detection and attribution is based on the TAR, and should probably reference it (Mitchell et al., 2001) and be verbatim and in quotation marks. [gabi hegerl (Reviewer's comment ID #: 103-8)]	Rejected. The definitons in the TAR are too lengthy and even refer back to the SAR.
1-158	A	8:29	8:33	I would suggest deleting "which is obviously not possible" and starting the sentence with "Using traditional approaches". I would then modify the next sentence to say "However, with no Earth with which to experiment, attribution of anthropogenic climate change must	Accepted.

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				be pursued by (a) detecting that the climate has changed (as defined above); (b) demonstrating ...; and (c) demonstrating ..." [Michael MacCracken (Reviewer's comment ID #: 152-238)]	
1-159	A	8:31	8:33	For (b), please explain that it is assumed that the model can represent both the natural variability and patterns associated with external forcing. [Govt. of Australia (Reviewer's comment ID #: 2001-116)]	rejected. This is discussed in section 1.5
1-160	A	8:32	8:34	Change "predictions" to simulations -- elsewhere GCM outputs are only referred to as simulations [Ross McKitrick (Reviewer's comment ID #: 174-4)]	Accepted.
1-161	A	8:32	8:34	Wording of (c) should be consistent with (b). This would imply using the wording: "...demonstration that the detected change is not consistent with computer model predictions of a counterfactual climate-change "signal" that is calculated to occur in the absence of anthropogenic forcing due to greenhouse gases." [Ross McKitrick (Reviewer's comment ID #: 174-5)]	Rejected. The suggested change does not reflect the procedure used in the apropriate studies.
1-162	A	8:32	8:34	The current inconsistency of the wording masks the layers of underlying maintained hypotheses, as spelled out in Allen and Tett (1999). These should be spelled out, by adding a quote directly from Allen and Tett, immediately after line 34, as follows: "It is important to recognise that the demonstration of internal consistency is all that can ever be expected from a formal attribution study. Proof that the model is "correct", meaning that every alternative has been taken into account and rejected, is a logical impossibility." 345 1-345 6 [Ross McKitrick (Reviewer's comment ID #: 174-5)]	Rejected. The addition would not add to clarity nor brevity. See also comment to 1-161.
1-163	A	8:34	8:34	Add at end "(d) demonstration that the change could be the result of a combination of anthropogenic and natural changes. Inpractice alternative (d) is usually the most likely, but the exact contribution of the two components is difficult to determine.". [VINCENT GRAY (Reviewer's comment ID #: 88-80)]	Rejected. The addition would not andd to clarity or brevity. In d&a studies the individual forcing components are analysed, the response pattern are separately determined and conclusions are drawn for about the individual contributions. Therefore b) and c) implies the suggested d). This is discussed in chapter 9.
1-164	A	8:36	8:41	I would reverse the order of the second and third sentences, both for reasons of logical flow and to match the ordering of points in the first sentence of the paragraph. Somehow, there also ought to be mention that we also try to learn from examining the responses to volcanic and solar forcing. [Michael MacCracken (Reviewer's comment ID #: 152-239)]	Taken into account. The two sentences have been exchanged. Volcanic ans solar forcing are mentioned.
1-165	A	8:36	8:36	Change "as well as" to "and". Begin the next sentence with "So" and put it after the	Accepted.

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				following sentence. [David Parker (Reviewer's comment ID #: 195-13)]	
1-166	A	8:36		The first sentence shifts the balance too much to models in my view. It should to be clarified that detection and attribution is all about understanding observed climate changes in terms of radiative forcing response and internal climate variability. The model data are merely a tool for interpretation. This is sometimes missed in the discussion of those results, so its useful to emphasize. [gabi hegerl (Reviewer's comment ID #: 103-9)]	Rejected. The sentence clearly state that observational and model data are needed.
1-167	A	8:38	8:38	Add at end "but not natural changes that are the result of evolution" [VINCENT GRAY (Reviewer's comment ID #: 88-81)]	Rejected. The models simualte all natural changes on the relevant time scale.
1-168	A	8:43	8:43	Delete "well-mixed" This is a myth. They are not "well-mixed". Even the biased series at present only measured over the oceans shows a definite change with latitude (see NOAA website) but there would be much greater variability if measuremments over land could be made [VINCENT GRAY (Reviewer's comment ID #: 88-82)]	Rejected. See chapter 2.
1-169	A	8:49	:50	A better sentence would read, "…warming in 1980, Madden and Ramanathan (1980) and Hansen et al. (1981) predicted it would be evident by the year 2000." (The Madden-Ramanathan text p. 767 says it would appear sometime before 2000, and Hansen et al. similarly but independently, using different methods.) The reference is: Hansen, J. E., D. Johnson, A. Lacis, et al.,1981: Climate impact of increasing atmospheric carbon dioxide. Science, 213, 957-966. [Govt. of United States of America (Reviewer's comment ID #: 2023-15)]	Accepted.
1-170	A	8:50	8:53	This result assumes that the nature and sources of natural variability are known and understood. [Govt. of Australia (Reviewer's comment ID #: 2001-117)]	Noted. No action recommended and taken.
1-171	A	8:50	8:53	Estimates of internal variability on multi-decadal-to-centennial time scales is an aspect of climate models that many of us have a lot of concern about, given the heavy reliance on these numbers in detection/ attribution studies. It might be useful to recognize this worrying dependency more explicitly here. [Isaac Held (Reviewer's comment ID #: 105-3)]	Noted. This is dicussed in Chapter 9.
1-172	A	8:53	8:53	Add at end "however, the changes can largely be explained by human socioeconomic factors (see (see McKitrick and Michaels 2004 Climate Research Vol 26 pages 159-173) 199 1-199 83 [VINCENT GRAY (Reviewer's comment ID #: 88-3)]	Rejected. The suggested addition does not add to clarity or brevity.
1-173	A	9:0	19:	Like ENSO, monsoon also has significant impact on global climate. Although monsoon is influenced by ENSO and other climate oscillations, it is in fact a result of strong land-	Noted: This comment seems to be at the wrong place.

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				ocean-atmosphere interaction. I believe a detailed discussion of monsoon is appropriate in “Section 1.4 Examples of Progress in Understanding Climate Processes”, just like the discussion of ENSO in “Sub-Section 1.4.6 Ocean and Coupled Ocean-Atmosphere Dynamics”. [Jilan Su (Reviewer’s comment ID #: 260-1)]	
1-174	A	9:2	9:2	Change "analyzes" to "analyses of". Also, on this line, change "This makes" to "Studies with multiple variables make" [Michael MacCracken (Reviewer’s comment ID #: 152-240)]	Accepted.
1-175	A	9:2	9:2	Change "analyzes" to "analyses". [David Parker (Reviewer’s comment ID #: 195-14)]	Accepted.
1-176	A	9:4	9:4	Delete "the" from the end of the line. [David Parker (Reviewer’s comment ID #: 195-15)]	Accepted.
1-177	A	9:6		A number of recent publications by Barnett, Levitus and colleagues have "fingerprinted" the anthropogenic signal in ocean temperature data. I recommend they be cited here. [Franklin SCHWING (Reviewer’s comment ID #: 230-3)]	Rejected. We focus on the papers up to the TAR.
1-178	A	9:6		A number of recent publications by Barnett, Levitus, and colleagues have “fingerprinted” the anthropogenic signal in ocean temperature data. Cite them. [Govt. of United States of America (Reviewer’s comment ID #: 2023-16)]	Rejected. We focus on the papers up to the TAR.
1-179	A	9:8	9:8	Replace "clearly statistically" by "sometimes claimed to be" [VINCENT GRAY (Reviewer’s comment ID #: 88-84)]	Rejected. The appropriate papers state a statistical significance.
1-180	A	9:8	9:14	The paragraph says studies "over the past decade". But the Santer papers predate 1997. [Ross McKitrick (Reviewer’s comment ID #: 174-7)]	Accepted. The wording has been changed.
1-181	A	9:8	9:14	The prior paragraph refers to the recent development of 4-d fingerprints, but provides no reference. All the references in this paragraph pre-date the TAR, suggesting they pre-date 4-d fingerprinting. [Ross McKitrick (Reviewer’s comment ID #: 174-8)]	Taken into account. The wording has been changed.
1-182	A	9:8	:14	Would this be a good place to list the SAR and TAR conclusions? [gabi hegerl (Reviewer’s comment ID #: 103-10)]	Rejected. The suggested change would substantially increase the length of the chapter.
1-183	A	9:11	9:11	Add at end "but they can be explained by human influencves wwhich do not involve greenhouse gas emissions (see McKitrick and Michaels 2004 Climate Research Vol 26 pages 159-173)" [VINCENT GRAY (Reviewer’s comment ID #: 88-85)]	Rejected. The paper has been published after the TAR
1-184	A	9:12	9:12	Insert after "influence" "such as the identified socioeconomic factors" [VINCENT GRAY (Reviewer’s comment ID #: 88-86)]	Rejected. The reviewer does not any reference to substatiate his claim.
1-185	A	9:14	9:14	Add at end "such as these socioeconomic factors"	Rejected. The reviewer does not any

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				[VINCENT GRAY (Reviewer's comment ID #: 88-87)]	reference to substatiate his claim.
1-186	A	9:18	9:24	Spencer Weart's "The Discovery of Global Warming". Harvard University Press. 2003 should be referenced as an authoritative review of the history. [Govt. of Australia (Reviewer's comment ID #: 2001-118)]	Accepted
1-187	A	9:21		If a hypertext reference is permitted, replace "Fleming (1998) provides" with "Fleming (1998) and Weart (2006) provide…" The new reference is: Weart, S., 2006: The discovery of global warming, http://www.aip.org/history/climate/ . [Govt. of United States of America (Reviewer's comment ID #: 2023-17)]	Taken into account – ref to book is noted, but the web link is not appropriate here.
1-188	A	9:21		This work has been peer-reviewed so far as is feasible for an annually updated web site. It comprises about a quarter of a million words and 1700 references on the topic. If hypertext referencing is not allowed, a possible substitute would be Weart (2003: Weart, S., 2003, The discovery of global warming, Harvard University Press, Cambridge, MA, 228 pp. [Govt. of United States of America (Reviewer's comment ID #: 2023-18)]	Accepted
1-189	A	9:22	9:57	These 3 sections should refer the following original documentary sources: Tynall, J.1861. On the absorption and radiation of heat by gasese and vapours, and on the physical connection.Phil. Mag.,22,277-302. Arrhenius, S.1896. On the influence of carbonic acid in the air upon the temperature on the ground.Phil. Mag.,41,237-276 [Govt. of China (Reviewer's comment ID #: 2006-25)]	Accepted
1-190	A	9:30	9:30	Pouillet, not Poulliet [Govt. of France (Reviewer's comment ID #: 2010-6)]	Accepted
1-191	A	9:30	9:30	Pouillet, not Poulliet [Robert Kandel (Reviewer's comment ID #: 123-4)]	ditto
1-192	A	9:38	9:38	Add at end "He was the first to identify water vapour as the major greenhouse gas" [VINCENT GRAY (Reviewer's comment ID #: 88-88)]	Rejected, correct as is, this is already implied
1-193	A	9:42	9:43	Amend text to "…appears that the initial climatic changes preceded the change in CO2 but were enhanced by…" [David Parker (Reviewer's comment ID #: 195-16)]	Accepted
1-194	A	9:44	9:44	Even though he did not conduct a thought-experiment on changing CO2 in the earth's atmosphere, one might mention the analytical model described in Milankovitch, M., 1920 : Théorie mathématique des phénomènes thermiques produits par la radiation solaire. Paris, Gauthier-Villars, 338 pp. This includes (under a different name) a greenhouse absorption factor, and is applied to planets Mercury, Mars, and Venus as well as Earth. See in particular chap. IV: Rapport entre l'insolation et la temperature des planets, en tenant compte de leurs atmosphères. Milankovitch does compute a high surface temperature for Venus, but resulting from strong water vapor absorption in his model	Rejected, this would take too long to insert and explain properly here. space limits.

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				rather than from CO2 optical thickness as in reality. [Govt. of France (Reviewer's comment ID #: 2010-7)]	
1-195	A	9:51	9:53	I think it would be more technically correct to say that this was an indication of warming in the North Atlantic sector of the Arctic rather than the whole Arctic in that the whole Arctic was not really being sampled. I also think we should be careful to say how this is mistaken; we have really not yet figured out how such a sectoral warming might have been natural either--it is not impossible, in my view, that this warming might have resulted from changes in atmospheric circulation induced by the rapid increases in SO2 emissions from tall stacks, which would very greatly increase the amount of sulfate in this region due to the longer lifetime before removal. So, I don't think we can rule out human influences, particularly sulfates, and maybe GHGs. I would suggest deleting "wrongly believed this climatic fluctuation could possibly be explained" and replacing this with "explained this, at least in part," [Michael MacCracken (Reviewer's comment ID #: 152-241)]	Taken into account with rewrite
1-196	A	9:52	9:52	"wrongly believed": this needs to be explained. [Ileana Blade (Reviewer's comment ID #: 22-9)]	Taken into account with rewrite
1-197	A	9:52		The "wrongly" if I interpret it correctly is in contradition to ch9 (9.4), where the early 20th century warming is interpreted as a combination of greenhouse gas, natural forcing and internal variability (how much of which varying between different publications). Admittedly, the Arctic warming was huge and probably largely due to internal variability?), but there may at least have been a contribution from greenhouse gas forcing. [gabi hegerl (Reviewer's comment ID #: 103-11)]	Taken into account with rewrite
1-198	A	9:54	9:54	Plass (1956) is not in the bibliography. [David Parker (Reviewer's comment ID #: 195-17)]	Rejected, the quote comes from Fleming, as now noted.
1-199	A	10:5	10:5	Replace "rather than" by "as well as" [VINCENT GRAY (Reviewer's comment ID #: 88-89)]	Taken into account with rewrite
1-200	A	10:6	10:6	Insert after "occur" , "fairly" [VINCENT GRAY (Reviewer's comment ID #: 88-90)]	Taken into account with rewrite
1-201	A	10:9	10:9	WAS projected to alter THE fraction of anthropogenic CO2 … [Ileana Blade (Reviewer's comment ID #: 22-10)]	Accepted
1-202	A	10:9	10:9	Amend text to "…oceans was projected to alter the fraction…". [David Parker (Reviewer's comment ID #: 195-18)]	Accepted
1-203	A	10:14	15:	"warming" of temperatures does not exist. Replace by increasing or some other term indicating the trend. [Michel J. ROSSI (Reviewer's comment ID #: 220-2)]	Rejected, cannot find any reference to this in the section or chapter. It is certainly not where noted.
1-204	A	10:15	10:15	sentence incomplete (over ?)	Accepted

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				[Ileana Blade (Reviewer's comment ID #: 22-11)]	
1-205	A	10:15	10:15	Delete "anthropogenic". Methane is not entirely "anthropogenic" neither is water vapour [VINCENT GRAY (Reviewer's comment ID #: 88-91)]	Rejected, correct as is.
1-206	A	10:15	10:15	Delete "over" [VINCENT GRAY (Reviewer's comment ID #: 88-92)]	Accepted
1-207	A	10:15	10:15	Delete "over" [Michael MacCracken (Reviewer's comment ID #: 152-242)]	Accepted
1-208	A	10:20	10:20	Replace "led a long campaign to build a consensus" by "argued" [VINCENT GRAY (Reviewer's comment ID #: 88-93)]	Taken into account. While correct as is, the revision in response to others has led to a rewrite.
1-209	A	10:22	10:22	Delete "anthropogenic and" [VINCENT GRAY (Reviewer's comment ID #: 88-94)]	Rejected, correct as is.
1-210	A	10:23	10:23	THUS, the current picture …. [Ileana Blade (Reviewer's comment ID #: 22-12)]	Accepted
1-211	A	10:23	10:23	Replace "driving climate change" with "contributing to changes in climate" [VINCENT GRAY (Reviewer's comment ID #: 88-95)]	Rejected, correct as is.
1-212	A	10:24	10:24	I don't think it is just "greenhouse agents", although I see why you write this (given the section title). This paragraph doesn't really refer to anything directly "greenhousy"? Perhaps you need to say that some of these cloud changes induce a greenhouse effect, although they also have a solar effect ? [Piers Forster (Reviewer's comment ID #: 73-37)]	Rejected, from the sentence above the agents is clearly chorthand for gases and aerosols that have a greenhouse effect.
1-213	A	10:26		The definition of the Quaternary is not consistent with that in chapter 6. I suggest that the latest guidelines of the ICS and INQUA on the issue are followed [Govt. of Spain (Reviewer's comment ID #: 2019-102)]	Accepted, have adopted INQUA of 2.6 Ma
1-214	A	10:28	10:28	Change "or" to "and". [David Parker (Reviewer's comment ID #: 195-19)]	Accepted
1-215	A	10:30	10:30	Change "million" to "millions of" [David Parker (Reviewer's comment ID #: 195-20)]	Accepted
1-216	A	10:30	10:30	Change "At much smaller…" to "On much shorter…" and move the sentence to after the following one. [David Parker (Reviewer's comment ID #: 195-21)]	Accepted, but then deleted the sentence.
1-217	A	10:46	10:46	Change "the last" to "recent". [David Parker (Reviewer's comment ID #: 195-22)]	Accepted
1-218	A	10:52	10:52	Should not "Quaternary" be capitalized--like Holocene? Also page 11, line 9 [Michael MacCracken (Reviewer's comment ID #: 152-243)]	Accepted

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1-219	A	11:6	11:6	Add the EPICA reference, which extends the record to 740,000 y BP. EPICA community members, 2004. Eight glacial cycles from an Antarctic ice core. Nature, Vol. 429: 623-628. [Govt. of France (Reviewer's comment ID #: 2010-8)]	Taken into account, the new ref cannot be added here (but in later chapter), but we have noted that the ice cores now reach nearly 1 Ma
1-220	A	11:9	11:9	You should cite the EPICA paper here, as it extends the record to 740,000 y BP. EPICA community members, 2004. Eight glacial cycles from an Antarctic ice core. Nature, Vol. 429: 623-628. [Robert Kandel (Reviewer's comment ID #: 123-5)]	ditto
1-221	A	11:9	11:9	Change "fast" to "rapid" [David Parker (Reviewer's comment ID #: 195-23)]	Accept
1-222	A	11:13	11:13	Abrupt climate change is mentioned often in the text. The term should be defined even if only a range can be given based on previous paleoclimate studies. Use definition from Chapter 6, page 18, lines 14-17. [Govt. of United States of America (Reviewer's comment ID #: 2023-19)]	Taken into account, have worked on sentence to be consisten with Chapter 6, but that section is too long to include. See the Glossary for this.
1-223	A	11:16	11:18	I think we need to be careful in how all this is said--during the last glacial, massive outpourings of meltwater give a mechanism for a rapid change in the ocean circulation. For the present, such a forcing is unlikely (and if Greenland melts that fast, we'll have a real sea level problem). I think what we want to say about today is that there can be abrupt realignments in atmospheric circulation that can cause rather significant changes in subcontinental scale weather (temperature and precipitation) and that this may happen without much change in the ocean--and then may happen more as the ocean changes (gradually, as the models suggest). The key point, it seems to me, is to not (yet) make this out as contradictory to what models are capable of. [Michael MacCracken (Reviewer's comment ID #: 152-244)]	Rejected – interesting, but too much to insert here with space limitations.
1-224	A	11:26	11:33	As written this appears to contradict Page 8, Lines 50-53, which implies limited uncertainty. To ensure consistency, the regional (basin to hemisphere) scale of the variability should be specified. Timescales should also be clarified. [Govt. of Australia (Reviewer's comment ID #: 2001-119)]	Taken into account, with addition at line 33. this clearly applies only to glacial periods.
1-225	A	11:26	11:26	Insert after "variability" "and change" [VINCENT GRAY (Reviewer's comment ID #: 88-96)]	Rejected, correct as is.
1-226	A	11:26	11:33	While the previous paragraph notes that such abrupt changes tend to be regional, this paragraph does not. [Michael Manton (Reviewer's comment ID #: 157-46)]	Taken into account with qualifier added to previous paragraph
1-227	A	11:29	11:29	Change "this new data' to "these new data" (and page 12, line 26, change "data has" to "data have" 317 1-317 245 [Michael MacCracken (Reviewer's comment ID #: 152-46)]	Accepted, but phrase dropped

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1-228	A	11:29	11:29	Change "this" to "these" [David Parker (Reviewer's comment ID #: 195-24)]	Accepted, but phrase dropped
1-229	A	11:35	11:35	that COULD BE observed directly … [Ileana Blade (Reviewer's comment ID #: 22-13)]	Accepted, but phrase dropped
1-230	A	11:50	11:50	"The global extent": of what? Also, this seems to contradict the rest of the paragraph which describes regional changes … [Ileana Blade (Reviewer's comment ID #: 22-14)]	Accepted
1-231	A	11:54	12:31	There is an editing mistake here: the two paragraphs contain essentially the same sentences. Perhaps the first paragraph was meant to be deleted? Also, the definition of proxy (Page 12, line 15) comes after the concept has been used (Page 11, line 35) [Ileana Blade (Reviewer's comment ID #: 22-15)]	Accepted
1-232	A	11:54	12:38	Paleoclimate research started ion the 18th century and linked to both natural and anthropogenic factors from the very beginning. From our current perspective, these were important scientific debates (e.g., Mann (Abbé) (1790) Ueber die allmählichen Veränderungen der Temperatur und des Bodens in verschiedenen Climaten, nebst Untersuchungen über die Ursachen dieser Veränderungen. Historia et Commentationes AcademiaeTheodoro-Palatinat. Vol. 6, Physicum Mannheimii, pp. 82-111, Williamson H (1771) An attempt to account for the change of climate, which has been observed in the Middle Colonies in North-America. Trans. Amer. Phil. Soc. 1.). Other references would be Volnay, Ideler, Webster and many more. [Stefan Brönnimann (Reviewer's comment ID #: 30-2)]	Rejected. Abbe Mann's review of the ancient literature is not really modern science. Further, proper treatment here would not fit in the chapter space limits.
1-233	A	11:54	12:31	The level of detail on proxy data strikes me as out of balance with the level of detail elsewhere [Isaac Held (Reviewer's comment ID #: 105-4)]	Accepted – the duplicate sections have been dropped.
1-234	A	11:54	12:10	Delete this text as it is mostly repeated in slightly better form in the next paragraph. The lost references from page 12 lines 2-4 can be used in the paragraph below or deleted from the bibliography. [David Parker (Reviewer's comment ID #: 195-25)]	Accepted
1-235	A	12:0		1.4.3: This section does not adeqautely convey the uncertain and indirect nature of the inferences about variations in solar flux on time scales longer than the suspot cycle [Isaac Held (Reviewer's comment ID #: 105-7)]	Noted.
1-236	A	12:1	:26	Text repeats itself with some variations; the two passages should be combined. [Govt. of United States of America (Reviewer's comment ID #: 2023-20)]	Accepted
1-237	A	12:4	12:4	Replace "human proxy data" with "phenological and historical data". [Govt. of Australia (Reviewer's comment ID #: 2001-120)]	Accepted
1-238	A	12:4	12:9	After the"Lamb,1969;",add "Zhu,1973;". Reference: Zhu Kezhen.1973. A preliminary	Accepted

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				study on the climate changes since the last 5000 years in China. Science in China, 2,168-189. [Govt. of China (Reviewer's comment ID #: 2006-26)]	
1-239	A	12:12	12:31	Paragraph lacks focus. Repetitive and covered in Chapter 6. Please shorten by distilling essential points. [Govt. of Australia (Reviewer's comment ID #: 2001-121)]	Accepted
1-240	A	12:12	12:31	The section 1.4.3 overlaps with the previous one; they should be combined. [Govt. of France (Reviewer's comment ID #: 2010-9)]	Accepted
1-241	A	12:12	12:12	can we have a uniform way of referring to previous reports – FAR? or AR2? [Govt. of United Kingdom (Reviewer's comment ID #: 2022-2)]	Accepted, we are trying to be consistent
1-242	A	12:12	:31	I am not an expert here, but it seems to me there is too much emphasis on Mann et al., and could be more emphasis on earlier reconstructions, e.g. Bradley and Landsberg (?? Forgot the exact detail, old decadal reconstruction; from mid-90s - sorry am inflight can't check). [gabi hegerl (Reviewer's comment ID #: 103-12)]	Rejected, the Mann et al is duly noted as initiating the multi-proxy approach
1-243	A	12:12	:13	Pollen is not the only kind of plant evidence, oxygen isotopes are not the only isotope, varved lakes are not the only kind of lake sediment, and loess not the only kind of terrestrial sediment that contributed to paleoclimate reconstructions in the FAR. Sentence should be amended to read, "Paleoenvironmental/paleoclimatic reconstructions cited in the FAR were based on various kinds of data, including pollen and plant macrofossil records, insect and animal remains, growth and geochemical measurements from tree rings, corals and ice cores, and other sedimentological and geochemical data from lake, terrestrial, and marine sediments. These records provided estimates of climate variability on time scales from millions of years to the last few centuries, in some settings at year-to-year resolution (e.g., laminated marine and lake sediments, tree rings, corals, speleothems, and ice cores)." [Govt. of United States of America (Reviewer's comment ID #: 2023-21)]	Taken into account: we have revised the section but not used the quoted text here because of need to cut the chapter length.
1-244	A	12:15		The definition of proxy is incomplete. A climate proxy is a ALSO local record of a a CHEMICAL quantity, such as the ratio between two different molecules or the number of double bonds in an organic molecule. [Govt. of Spain (Reviewer's comment ID #: 2019-103)]	Taken into account with mention of chemical and isotope data.
1-245	A	12:16		Cite the authors for "FAR chapter 2". While this appears on page 14, not 16, citation of earlier ARs should be consistent throughout AR4. [Govt. of United States of America (Reviewer's comment ID #: 2023-22)]	Taken into account, we will try to assure that all IPCC refs are to the chapters where appropriate.
1-246	A	12:17		a proxy is interpreted as a climate variable (e.g., temperature or rainfall) using a transfer function that is based on physical principles, AS WELL AS CHEMICAL (e.g. synthesis or dissolution of molecules) AND ECOLOGICAL (e.g. species competition, habitats) PRINCIPLES	Taken into account with revision that also shortened text.

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				[Govt. of Spain (Reviewer's comment ID #: 2019-104)]	
1-247	A	12:27	12:27	...variability (Wanner et al., 1995; Mann et al., 1998; Luterbacher et al., 1999). Please change and add the following references: ...variability (Wanner et al. 1995; Mann et al., 1998; Luterbacher et al. 2002, 2004; Xoplaki et al. 2005). The references are: Xoplaki, E., Luterbacher, J., Paeth, H., Dietrich, D., Steiner N., Grosjean, M., and Wanner, H., 2005: European spring and autumn temperature variability and change of extremes over the last half millennium, Geophys. Res. Lett., 32, L15713. Luterbacher, J., Dietrich, D., Xoplaki, E., Grosjean, M., and H. Wanner, 2004: European seasonal and annual temperature variability, trends and extremes since 1500, Science, 303, 1499-1503. Luterbacher, J. , E. Xoplaki, D. Dietrich, R. Rickli, J. Jacobeit, C. Beck, D. Gyalistras, C. Schmutz and H. Wanner, 2002: Reconstruction of Sea-Level Pressure Fields over the Eastern North Atlantic and Europe Back to 1500. Climate Dynamics, 18, 545-561 [Jürg Luterbacher (Reviewer's comment ID #: 151-1)]	Rejected, this is post-TAR material discussed if appropriate in the later chapters.
1-248	A	12:27	12:31	In light of the controversies over MBH98 these lines ought to be deleted. It wasn't a "great advance" it was a black box that no one understood at the time and no one has used since. If it really yielded "true northern hemisphere temperatures" etc. then why has no one else adopted the methodology, and why don't even Mann and his coauthors use it? The methodology has since been shown to be unduly sensitive to minor variations in assumptions (Burger and Cubasch 2005), it embeds a serious error in the implementation of principal component analysis (McIntyre and McKitrick 2005a), and it yields results that are pivotally dependent on the use of invalid bristlecone pine series and which are statistically insignificant (McIntyre and McKitrick 2005a, 2005b). The adulatory tone in these lines is inappropriate. [Ross McKitrick (Reviewer's comment ID #: 174-9)]	Rejected, this is post-TAR material discussed if appropriate in the later chapters.. Also correct as written
1-249	A	12:27	12:31	References for above cell: McIntyre, Stephen and Ross McKitrick (2005a) Hockey Sticks, Principal Components and Spurious Significance Geophysical Research LettersVol. 32, No. 3, L03710 10.1029/2004GL021750; McIntyre, Stephen and Ross McKitrick (2005b) "The M&M Critique of the MBH98 Northern Hemisphere Climate index: Update and Implications" Energy and Environment 16(1)69-100. Bürger, Gerd and Ulrich Cubasch (2005) "Are Multiproxy Climate Reconstructions Robust?" Geophysical Research Letters, VOL. 32, L23711, doi:10.1029/2005GL024155, 2005. [Ross McKitrick (Reviewer's comment ID #: 174-10)]	Rejected, this is post-TAR material discussed if appropriate in the later chapters.
1-555	B	12:27	12:27	There are serious problems with the Mann et al reconstruction; the dust has not really settled. You don't need to endorse it for the purpose of this study and it might be prudent of you not to do so. Other studies collected information on an annual basis e.g. Bradley and Jones 1993 or several others.	Rejected, the Mann et al study was an important furst study. The dust has settled with the recent NAS report that notes minor errors in Mann et al, but

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				[Stephen McIntyre (Reviewer's comment ID #: 309-5)]	ones that did not impact the results and were appropriate for such a first-time effort.
1-556	B	12:27	12:27	You say: "With the development of multi-proxy reconstructions, the climate data has been extended not only from local to global, but also from instrumental data to patterns of climate variability (Wanner et al., 1995; Mann et al., 1998; Luterbacher et al.". However, there is considerable quesiton about the ability of MBH98 to reconstruct even the overall temperature - no one has dug into the validity of their regional patterns, which might easily prove to be mere artefacts of singular value decomposition of noisy matrices. [Stephen McIntyre (Reviewer's comment ID #: 309-6)]	Rejected, see above.
1-250	A	12:31	12:31	Add at end "Proxy measurements are distributed even less representatively than weather stations, so it is doubtful whether they can provide a meaningful global average. Also mathematical errors have recently been found in Mann's work which overturn his conclusion that current tempertures are unusual on a historic scale. (See McIntye and McKitrick 2003 Vol 14, pages 751-771)" [VINCENT GRAY (Reviewer's comment ID #: 88-97)]	Rejected, it has been rewritten to note that these are only NH estimates. Also see note above.
1-251	A	12:31	12:31	Change "values" to "estimates". [David Parker (Reviewer's comment ID #: 195-26)]	Accepted
1-252	A	12:40	13:43	Here one should mention proxies of solar variability (aa' index, F10.7 cm flux, neutron monitors). This would be a good area to show progress. [Stefan Brönnimann (Reviewer's comment ID #: 30-6)]	Rejected. This chapter deals not with the progress in solar physics.
1-253	A	12:40	13:43	The seciton on solar forcing seems a bit over-enthusiastic, for example, the EBM stuff also shows that the changes in response to estimated solar forcing changes are small compared to overall climate changes. It is important to stress that detection and attribution results show that even a substantial enhancement of solar forcing by the atmosphere cannot explain more than a part of the observed warming over the 20th century, since the time-space pattern of observed warming is not consistent with solar forcing only. Also, solar forcing can be mixed up with volcanic forcing (which would be good to mention here, also, is probably at least as important as solar?). The final paragraph of this section should mention these findings some more, see also papers by Stott et al. and paleo papers on detection of influence of solar and volcanic forcing in chapter 9 (9.3 end and 9.4). [gabi hegerl (Reviewer's comment ID #: 103-13)]	Taken into consideration. The wording has been changed to improve clarity of the paper.
1-254	A	12:40	13:43	In general, I find this section exhibits excessive indulgence and credulity with respect to claims of evidence for solar-climate connections. I make this remark on the basis of my reading of the literature in the light of over 15 years experience (admittedly a long time ago) in astrophysics and solar physics research. See Chapter 2, p. 55-57 of this IPCC WG I SOD report, for a more up-to-date and balanced picture.	Taken into consideration. The wording has been changed to improve clarity of the paper.

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				[Robert Kandel (Reviewer's comment ID #: 123-7)]	
1-255	A	12:40	13:43	It is not clear that this section is altogther consistent with chapter 2 on solar variability [Michael Manton (Reviewer's comment ID #: 157-47)]	Taken into consideration. The wording has been changed to improve clarity of the paper.
1-256	A	12:44	12:44	...radiative forcing of about 0.23Wm-2..." this is too precise. According to Chap2,P6,L36 solar cycle variations in TSI are 0.08%, which corresponds to 0.19Wm-2 radiative forcing. I suspect the figure of 0.1% (P13 L25) is used here. Suggest say about "0.2Wm-2 [Gareth S. Jones (Reviewer's comment ID #: 121-1)]	Accepted.
1-257	A	12:46		Including the following reference could be interesting. In this paper it is presented how solar activity produces a modulation on the relationship between the Northern Hemisphere winter temperature and a tropospheric climate pattern like the North Atlantic Oscillation. Gimeno L., de la Torre L., Nieto R., García R., Hernández E. and Ribera P. 'Changes in the relationship NAO-Northern Hemisphere Temperature due to solar activity'. Earth and Planetary Science Letters, 206, 15-20. 2003. [Pedro Ribera (Reviewer's comment ID #: 213-3)]	Rejected. The reference is post-TAR.
1-258	A	12:49	12:49	The term "relatively small" is unecessarily vague. Also, listing all of these energy-balance references for something that is essentially trivial seems like overkill. [Isaac Held (Reviewer's comment ID #: 105-6)]	Accepted.
1-259	A	12:51		centigrade --> celcius? [Richard Allan (Reviewer's comment ID #: 3-8)]	Accepted.
1-260	A	12:53	12:53	Replace "can be derived" with "has been inferred". [Govt. of Australia (Reviewer's comment ID #: 2001-122)]	Accepted.
1-261	A	12:53	12:53	"Solar radiation can be derived from sunspot number": this is kind of inaccurate. Maybe "solar radiation variations" ? [Ileana Blade (Reviewer's comment ID #: 22-18)]	Accepted.
1-262	A	12:53	12:53	The sentence "The solar radiation can be derived from the sunspot number" is at best an overstatement. Some researchers believe that it may be derived from sunspot number (since about 1600), some even go further and believe it can be derived from other indications of past solar activity such as C-14 or Be-10 abundances in independently dated samples. Even limiting the reconstructions to the past 4 centuries, there is considerable disagreement. Recent work by Lean (see her article in Physics Today, June 2005) has strongly restricted the likely range of variation. [Govt. of France (Reviewer's comment ID #: 2010-10)]	Taken into consideration. The text has been altered.
1-263	A	12:53	12:53	The statement that "solar radiation" can be derived from the sunsot number is vague and easily misinterpreted as implying that we know how the solar flux has changed in time quantitatively on time scales longer than the 11yr cycle, which is certainly not supported	Taken into consideration. The text has been altered.

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				by the text of the chapter. [Isaac Held (Reviewer's comment ID #: 105-5)]	
1-264	A	12:53	12:53	The statement "The solar radiation can be derived from the sunspot number" is too definite. There is a correlation between the two over the 11 yr cycle but for longer time periods there are different ways of estimating the changes in TSI. Recomend saying something like "Estimates of changes in the solar radiation can be calculated from the sunspot numbers" [Gareth S. Jones (Reviewer's comment ID #: 121-2)]	Taken into consideration. The text has been altered.
1-265	A	12:53	12:53	The sentence "The solar radiation can be derived from the sunspot number" is at best an overstatement, at worst plain wrong Although some researchers believe that it may be derived from sunspot number (since about 1600), others prefer umbra/penumbra ratio, or indications of past solar activity such as C-14 or Be-10 abundances in independently dated samples. Even limiting the reconstructions to the past 4 centuries, there is considerable disagreement. [Robert Kandel (Reviewer's comment ID #: 123-6)]	Taken into consideration. The text has been altered.
1-266	A	12:55	12:55	reverse order: ROUTINELY MONITOR [Ileana Blade (Reviewer's comment ID #: 22-16)]	Accepted.
1-267	A	12:57	13:4	The Maunder Minimum (MM) happened during the so called "Little Ice Age" (LIA). The only other equivalent minimum during the same period was probably the Sporer Minimum (1500s) and even then that is only known about through radionuclides not direct observation of sunspots. So claiming that the MM was one of several during the LIA is not accurate. The Dalton Minimum (~1800) had SSN similar to that at the start of the 20th Century so isn't really equivalent to the MM. If the authors are noting the coincidence of low sunspot numbers and the LIA they should perhaps also mention that there were also high sunspot numbers during the LIA (~1780 and ~1850) not very much lower than present day. [Gareth S. Jones (Reviewer's comment ID #: 121-3)]	Accepted. The wording has been changed.
1-268	A	13:10	13:13	These two sentences are not clear: what was compared to what? And how is "solar maximum defined". Isn't sunspot cycle maximum" meant? 69 1-69 17 [Ileana Blade (Reviewer's comment ID #: 22-3)]	Accepted. The wording has been changed.
1-269	A	13:15	13:23	This paragraph seems out of place. Shouldn't it come earlier, before the influence of sunspots on solar irradiance is discussed? [Ileana Blade (Reviewer's comment ID #: 22-19)]	Accepted. The order has been changed.
1-270	A	13:16	13:20	The text should note that Arrhenius used Langley's estimate of TSI. [Govt. of Australia (Reviewer's comment ID #: 2001-123)]	Rejected. No reference os given.
1-271	A	13:19	13:20	I think it really makes scientists sound incompetent if there is not some explanation given for how far off Langley was. What was the cause of this--some geometric error, or was	Taken into consideration. Thw wording has been changed.

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				the instrument also being warmed by the ground or back IR radiation or what? [Michael MacCracken (Reviewer's comment ID #: 152-246)]	
1-272	A	13:20	13:23	It should be noted that although Abbot believed he had found TSI variations of a few percent (!) over the first half of the 20th century, these were shown to be essentially of atmospheric rather than solar origin by Sterne and Dieter in 1957. Foukal and Vernazza did later show that the 27-day period associated with solar rotation and passages of bright faculae over the solar disk could be detected in the Smithsonian record, with an amplitude of about 0.07%. [Govt. of France (Reviewer's comment ID #: 2010-11)]	Noted. This is to detailed and cannot be incorporated in the text due to space limitations.
1-273	A	13:20	13:23	It should be noted that although Abbot believed he had found TSI variations of a few percent (!) over the first half of the 20th century, these were shown to be essentially of atmospheric rather than solar origin by Sterne and Dieter in 1957. Foukal and Vernazza did later show that the 27-day period associated with solar rotation and passages of bright faculae over the solar disk could be detected in the Smithsonian record, with an amplitude of about 0.07%. [Robert Kandel (Reviewer's comment ID #: 123-9)]	Noted. This is to detailed and cannot be incorporated in the text due to space limitations.
1-274	A	13:25	13:30	These issues are very well summarized by Judith Lean in her June 2005 Physics Today article. [Govt. of France (Reviewer's comment ID #: 2010-12)]	Taken into consideration The review of Lean has been published after the TAR. An indication has been given that this is dsicussed in chapter 2.
1-275	A	13:32	13:35	The recent results of Lean reduce the likely percent variation to much smaller values. [Govt. of France (Reviewer's comment ID #: 2010-13)]	Taken into consideration The review of Lean has been published after the TAR. An indication has been given that this is dsicussed in chapter 2.
1-276	A	13:32	13:34	"Historical" sunspot numbers cannot be used to estimate the TSI over 1000 years. There are not sunspot numbers going back that far. [Gareth S. Jones (Reviewer's comment ID #: 121-4)]	Taken into consideration. The text has been changed.
1-277	A	13:32	13:35	The results cited are at best questionable. The recent results of Judith Lean and others reduce the likely variation to much smaller values. See her June 2005 article in Physics Today. [Robert Kandel (Reviewer's comment ID #: 123-8)]	Taken into consideration The review of Lean has been published after the TAR. An indication has been given that this is dsicussed in chapter 2.
1-278	A	13:32	13:32	After "number" insert "and the characteristics of other, sun-like, stars" [David Parker (Reviewer's comment ID #: 195-27)]	Accepted.
1-279	A	13:34	13:35	Can these results considered as firmly established? Compare with chapter 2, pages 55-57, which gives a more up-to-date picture and exhibits far less credulity (or complaisance) with respect to the claims of the solar enthusiasts [Govt. of France (Reviewer's comment ID #: 2010-14)]	Taken into account. The wording has been changed.

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1-280	A	13:34	13:35	I am not sure it is clear enough that this is an old estimate of the TSI variability (latest estimates are smaller Chap2). Perhaps say "Indicated" rather than "indicate" ? [Gareth S. Jones (Reviewer's comment ID #: 121-5)]	Accepted.
1-281	A	13:37	13:38	This sentence should be clarified with a reference to the early part of the 20th century. [Govt. of Australia (Reviewer's comment ID #: 2001-124)]	Taken into accout. The wording has been changed.
1-282	A	13:37	13:43	This whole paragraph needs work as some concepts seem incomplete ("the shift towards UV with activity". Shift of what and activity of what?) and some sentences are awkward ("which, via .. ."') : Suggested rewrite: "The effects of solar flares on the atmosphere (via cloud nucleation) and those due to shifts in the solar spectrum towards the UV range, at times of high solar activity, are largely unknow. The latter may produce changes in tropospheric circulation via changes in static stability resulting from the interaction of the increased UV with stratospheric ozone. 72 1-72 20 [Ileana Blade (Reviewer's comment ID #: 22-124)]	Accepted.
1-283	A	13:37	13:38	At best an understatement, considering that the TSI forcing is much smaller than the greenhouse forcing. It might be correct to write "unless those changes can induce unknown large feedbacks in the climate system, operating selectively on shortwave forcing and not on longwave forcing." This has to do with the concept of efficacy, discussed elsewhere in the report. As for possible effects of solar activity on cloud nucleation (line 39), the most recent agitation has to do not so much with solar flare emissions as such as with the unproven and strongly questionable Marsh & Svensmark revision of the Friis-Christensen & Svensmark hypothesis that formation of (low !) clouds is affected by the flux of galactic cosmic rays varying with the strength of the solar wind. See Chapt. 2, pages 57-58. Also : N. Marsh, H. Svensmark, 2000. Low cloud properties influenced by solar activity. Phys. Rev. Lett. 85, 5004-5007. H. Svensmark, 1998. Phys. Rev. Lett. 22, 5027-5030. H. Svensmark, E. Friis-Christensen, 1997. Variation of cosmic ray flux and global cloud coverage – a missing link in solar-climate relationships. J. Atmos. Solar-Terr. Phys. 59, 1225-1232. And especially (not cited in Chapt. 2, but it should be ! : P.E. Damon, P. Laut, 2004. Pattern of strange errors plagues solar activity and terrestrial climate data. Eos, 89, 370, 374 [Govt. of France (Reviewer's comment ID #: 2010-15)]	Rejected. The suggested discussion does not add to clarity or brevity.
1-284	A	13:37	13:38	At best an understatement, considering that the TSI forcing is much smaller than the greenhouse forcing. It might be correct to write "unless those changes can induce unknown large feedbacks in the climate system, operating selectively on shortwave	Taken into account. The wording has been changed (see 1-282)

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				forcing and not on longwave forcing." Now that Lean and others have thrown doubt on earlier reconstructions of total solar irradiance variations prior to 1970, some solar-climate enthusiasts would invoke a further increase of the arbitrary "amplification" factor (i.e. the fudge factor needed to get a fit between the hypothesized solar forcing and the observed global mean surface temperature variation).This does have something to do with the concept of efficacy, discussed elsewhere in the report, but for me it reveals neo-astrological preconceptions. [Robert Kandel (Reviewer's comment ID #: 123-10)]	
1-285	A	13:38	13:43	The effects of solar flares on the atmosphere (e.g., on cloud nucleation), or the shift towards UV with activity and the interaction of the increased UV at times of high solar activity with the ozone in the stratosphere, which via an altered vertical stabiltiy changes the tropospheric circulation, are still unknown. More research to investigate the effects of solar behaviour on climate is needed before the magnitude of solar effects on climate can be stated with certainty. " Is ignorance really as absolute as indicated here? [Govt. of United Kingdom (Reviewer's comment ID #: 2022-4)]	Noted. The reviewer got the key message.
1-286	A	13:39	13:39	As for possible effects of solar activity on cloud nucleation, the most recent agitation has to do not so much with solar flare emissions as such as with the unproven (or disproven) and in any case strongly questionable Friis-Christensen & Svensmark hypothesis that formation of clouds is significantly affected by the flux of galactic cosmic rays varying with the strength of the solar wind. See Comment 17 below on Chapt. 2, pages 57-58. [Robert Kandel (Reviewer's comment ID #: 123-11)]	Taken into account. The word "solar flares" has been replaced by "galactic cosmic rays" – see comment 1-287.
1-287	A	13:39	13:39	I suggest replacing 'solar flares' with 'galactic cosmic rays', because they have been hypothetically linked to cloud nucleation, while solar flares have not, as far as I know [Jón Egill Kristjánsson (Reviewer's comment ID #: 136-3)]	Accepted.
1-288	A	13:39	13:40	Amend text to "…cloud nucleation), and of the interaction of the increased UV…." [David Parker (Reviewer's comment ID #: 195-28)]	Accepted. –see comment 1-282
1-289	A	13:45	14:	This chapter overlooks work before the FAR on non-CO2 greenhouse gases. It would be worth at least mentioning that already in the 1970s, Veerabhadran Ramanathan and others noted that some gases were more effective in trapping radiation than CO2, and their levels were rising rapidly. Good references would be: Ramanathan, V., 1975, Greenhouse effect due to chlorofluorocarbons: Climatic implications, Science, 190, 50-52; Ramanathan, V., L. B. Callis, and R.E. Boughner, 1976, Sensitivity of surface temperature and atmospheric temperature to perturbations in the stratospheric concentration of ozone and nitrogen dioxide, J. Atmospheric Sciences, 33, 1092-1112.	Taken into account. The reference to one of these occurs in 1.4.1 where it belongs.

No.	Batch	Page:line From	Page:line To	Comment	Notes
				[Govt. of United States of America (Reviewer's comment ID #: 2023-23)]	
1-290	A	14:7	14:21	Some disorder or redundance here in the presentation of indirect GW effects. The concept that "many gases produced indirect effects on the global radiative forcing" has just been mentioned in the above paragraph. Maybe there's some nuance but it's not clear to the reader. [Ileana Blade (Reviewer's comment ID #: 22-21)]	Noted, but no fix.
1-291	A	14:12		The reference to the chapters seems unclear. Perhaps say "For more details see chapters 2, 7, and 10." This comment also applies to lines 29 and 43 and later. [Govt. of United States of America (Reviewer's comment ID #: 2023-24)]	Taken into account, we are trying to be consistent.
1-292	A	14:14	14:14	RF is now measured at the tropopause rather than TOA. Therefore I would change "at the top of the atmosphere" to "to the climalte sytem" or similar… [Piers Forster (Reviewer's comment ID #: 73-28)]	Accepted
1-293	A	14:22	14:23	Actually the radiative forcings due to tropospheric ozone had been evaluated by 1990. Lacis et al. (1990) found a warming of the surface temperature due to ozone changes to be about 20% of the warming contributed by CO2. Delete the sentence. [Andrew Lacis (Reviewer's comment ID #: 138-2)]	Taken into account, section revised and ref included. The key word is "assessed" as in IPCC, not just published.
1-294	A	14:23	14:23	I suggest replacing 'these' by 'the associated' [Jón Egill Kristjánsson (Reviewer's comment ID #: 136-4)]	Accepted
1-295	A	14:34	14:34	I think the word "development" should be changed to "utilization" or "application" as development started a good deal earlier. [Michael MacCracken (Reviewer's comment ID #: 152-247)]	Rejected, correct as is, note the qualifier "widespread"
1-296	A	14:40	14:40	Again, the word 'being' must be replaced by 'causing', because the depletion is not a forcing by itself; rather the forcing is a result of the depletion. [Jón Egill Kristjánsson (Reviewer's comment ID #: 136-5)]	Taken into account with revisions
1-297	A	14:41	14:41	"as well as altering": subject ? [Ileana Blade (Reviewer's comment ID #: 22-22)]	Rejected, correct as is
1-298	A	14:45	14:45	Would this not have had to be 1994 if work was underway on the special report on radiative forcing? [Michael MacCracken (Reviewer's comment ID #: 152-248)]	Accepted
1-299	A	14:46	14:46	"intensive set of chapters" ??? Extensive ? [Ileana Blade (Reviewer's comment ID #: 22-23)]	Taken into account with re-wording
1-300	A	14:46	14:46	Delete "significant breakthroughs had occurred. The special report" [VINCENT GRAY (Reviewer's comment ID #: 88-98)]	Rejected, correct as is.
1-301	A	15:4	13:5	Definitional issue. Replace "residence time" with "life time of a perturbation". [Govt. of Australia (Reviewer's comment ID #: 2001-125)]	Accepted
1-302	A	15:4	15:4	greater THAN PREVIOUSLY ANTICIPATED	Accepted

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				[Ileana Blade (Reviewer's comment ID #: 22-24)]	
1-303	A	15:10	15:10	I think a brief description of the indirect effects of aerosols is in order before this sentence. [Ileana Blade (Reviewer's comment ID #: 22-25)]	Rejected, have limited space to explain all. Sentence revised however.
1-304	A	15:10	15:10	sulfate aerosol indirect effects? [David Parker (Reviewer's comment ID #: 195-29)]	Accepted
1-305	A	15:13	15:13	direct sulfate RF? [David Parker (Reviewer's comment ID #: 195-30)]	Accepted
1-306	A	15:23		Concerns over the environmental impact of aviation go back much earlier than the 1990s. It was in the early 1970s that there were concerns over photochemical ozone depletion due to stratospheric emissions of nitrogen oxides from supersonic aircraft, predating what turned out to be the more serious problem of depletion due to CFC emissions. [Adrian Simmons (Reviewer's comment ID #: 242-17)]	Rejected. This is very interesting and true, but not directly relevant since the SST assessments were very early hypothetical aircraft, not the current fleet. It would be nice to do this, but it would take a long paragraph and we have to cut length.
1-307	A	15:33	15:33	Section 2.6 is refered to here (contrails). But the sentence appears to be citing forcing-response discussion, which is our section 2.8? Perhaps both sections should be cited? [Piers Forster (Reviewer's comment ID #: 73-36)]	Accepted
1-308	A	15:50	17:7	It would be valuable to note the impact of the difference in the latent heat between ice and water on the overall energy budget in the cryosphere, particularly on the fluxes into the atmosphere. [Govt. of Australia (Reviewer's comment ID #: 2001-126)]	Topic covered in Ch. 4.
1-309	A	15:52	15:53	The cryospheric components "snow", "river and lake ice" and "Seasonally frozen ground" should be added (c.f. Table 4.1.1., Chapter 4, page 4, line 30-43). [Ketil Isaksen (Reviewer's comment ID #: 115-16)]	Accepted.
1-310	A	16:25	16:25	The sentence "Is it, ….. high latitudes?" is poorly worded and needs to be rephrased. I suggest something like "For instance, it is not clear whether this mechanism is the main reason for the high latitude amplification of the warming signal" [Jón Egill Kristjánsson (Reviewer's comment ID #: 136-6)]	Accepted.
1-311	A	16:28	16:29	Amend text to "..because there may be "large-scale discontinuities" (TAR)…." [David Parker (Reviewer's comment ID #: 195-31)]	Sentence re-written.
1-312	A	16:34	16:34	might cause a GLOBAL sea level rise of about 5 meters if MELTED ? [Ileana Blade (Reviewer's comment ID #: 22-26)]	Sentence re-written. "Melted" would be incorrect.
1-313	A	16:34	16:34	Does the 5 m estimate match other chapters. [Michael MacCracken (Reviewer's comment ID #: 152-249)]	Not inconsistent with other chapters.
1-314	A	16:37	16:37	insituinsitu	Accepted.

No.	Batch	Page:line		Comment	Notes
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				[Stefan Brönnimann (Reviewer's comment ID #: 30-3)]	
1-315	A	16:37	16:37	"In situ" appears twice at the beginning of the line [Jón Egill Kristjánsson (Reviewer's comment ID #: 136-7)]	Accepted.
1-316	A	16:37	16:51	here and elsewhere, "in situ" is repeated. [Ross McKitrick (Reviewer's comment ID #: 174-11)]	Accepted.
1-317	A	16:37	16:37	Amend typo where "in situ" is repeated. [David Parker (Reviewer's comment ID #: 195-32)]	Accepted.
1-318	A	16:37		repeat of "in situ" [Richard Allan (Reviewer's comment ID #: 3-9)]	Accepted.
1-319	A	16:37		double in situ [gabi hegerl (Reviewer's comment ID #: 103-14)]	Accepted.
1-320	A	16:37		in situin situ" -> "in situ [Pedro Ribera (Reviewer's comment ID #: 213-4)]	Accepted.
1-321	A	16:37		In situin situ should just be in situ. Same problem on line 51. [Govt. of United States of America (Reviewer's comment ID #: 2023-25)]	Accepted.
1-322	A	16:41	16:41	Should give dates of the Qing Dynasty. [Michael MacCracken (Reviewer's comment ID #: 152-250)]	Accepted.
1-323	A	16:51	16:51	insituinsitu [Stefan Brönnimann (Reviewer's comment ID #: 30-4)]	Accepted.
1-324	A	16:51	16:51	Again, "in situin situ" should be corrected to 'in situ' [Jón Egill Kristjánsson (Reviewer's comment ID #: 136-8)]	Accepted.
1-325	A	16:51	16:51	Amend typo where "in situ" is repeated. [David Parker (Reviewer's comment ID #: 195-33)]	Accepted.
1-326	A	16:51		in situin situ" -> "in situ [Pedro Ribera (Reviewer's comment ID #: 213-5)]	Accepted.
1-327	A	17:4	17:4	the representation OF THE CRIOSPHERE in climate models [Ileana Blade (Reviewer's comment ID #: 22-27)]	Accepted.
1-328	A	17:11	17:19	It would be useful to have a statement regarding the historical paucity of observations of the oceans compared to observations of the atmosphere. [Govt. of Australia (Reviewer's comment ID #: 2001-127)]	Accepted. Sentence added in third paragraph.
1-329	A	17:18	17:19	If the concepts are "still useful" then the reference showing them to still be useful should be rather more recent than 1967. [Adrian Simmons (Reviewer's comment ID #: 242-18)]	Accepted. Reference added.
1-330	A	17:21	17:25	Rather than mentioing only the "firsts", one should also mention the development of operational upper-air observations (see Brönnimann, S., G. P. Compo, P. D.	Rejected. Bejond the scope of this brief historical overview.

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				Sardeshmukh, R. Jenne, and A. Sterin (2005) New approaches for extending the 20th century climate record. Eos, 86, 2-7.) [Stefan Brönnimann (Reviewer's comment ID #: 30-5)]	
1-331	A	17:29	17:29	Insert "loosely" before "referred to" [David Parker (Reviewer's comment ID #: 195-34)]	Accepted
1-332	A	17:36	17:36	Insert "subsurface" before "ocean variability" [David Parker (Reviewer's comment ID #: 195-35)]	Accepted
1-333	A	17:43	:44	Suggested replacement: "Stommel (1961) proposed a mechanism, earlier suggested by Chamberlin (1906)…" where the reference is:Chamberlin, T. C., 1906: On a possible reversal of deep-sea circulation and its influence on geologic climates. J. Geology, 14, 363-373. [Govt. of United States of America (Reviewer's comment ID #: 2023-26)]	Accepted. Reference added.
1-334	A	17:45	17:45	Suggest briefly describing those states [Ileana Blade (Reviewer's comment ID #: 22-28)]	Taken into account through the previous comment.
1-335	A	17:55	18:8	The discussion of coupling between air and sea and its role in climate applies primarily to the extra tropical regions as we have a better idea of the effects of coupling on climate in the tropics (e.g., ENSO as discussed in the following paragraph). This distinction should be made in the text. [Govt. of United States of America (Reviewer's comment ID #: 2023-27)]	Rejected. It is stated that the comment is about "global" ocean circulation (i.e. not tropical-only circulations.
1-336	A	18:1	18:1	who NOTICED [Ileana Blade (Reviewer's comment ID #: 22-29)]	Accepted
1-337	A	18:16	18:16	Delete the "and" from between "Norman" and "Lockyer". [David Parker (Reviewer's comment ID #: 195-36)]	Accepted
1-338	A	18:22	18:23	I believe it is not the anomalously warm waters per se that spoil the fishery, but the lack of upwelling of nutrients. Weaker upwelling implies both fewer nutrients and warmer temperatures. [Adrian Simmons (Reviewer's comment ID #: 242-19)]	Accepted. Sentence removed.
1-339	A	18:26	18:29	"... interaction, through the SST field, between the [Walker circulation] and variability in the warm pool of equatorial warm water of the Pacific Ocean": what about the eastern Pacific? Suggest: AND OCEANIC VARIABILITY IN THE TROPICAL PACIFIC ? [Ileana Blade (Reviewer's comment ID #: 22-30)]	Rejected. This is a reference to Bjerknes strictly.
1-340	A	18:45	18:47	The Viking explorers found Iceland in the 9th century, Greenland in the 10th century and Newfoundland around year 1000. The first sentence here seems to imply that these people new about the North Atlantic seesaw. Is that really correct? The following sentence refers to the 18th century, which is several centuries after the Viking explorers. [Jón Egill Kristjánsson (Reviewer's comment ID #: 136-9)]	Accepted.

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1-341	A	18:51	18:56	Perhaps a one-sentence description of the NAO north-south pressure sea-saw is in order ? [Ileana Blade (Reviewer's comment ID #: 22-31)]	Accepted
1-342	A	18:51	18:51	In contrast to other NAO pioneers, Defant also had a focus on processes (ocean-atmosphere interaction, volcanic eruptions), which I think is an important aspect. [Stefan Brönnimann (Reviewer's comment ID #: 30-7)]	Rejected. Beyond the scope of this brief historical overview.
1-343	A	19:21	19:24	This paragraph appears to imply that understanding the physical processes involved in producing low frequency variability is crucial for (i) improving our ability to accurately predict climate change and (ii) allowing the separation of anthropogenic and natural variability, thereby improving our ability to detect and attribute anthropogenic climate change. A line mentioning this would add to the importance of this section. [Richard Allan (Reviewer's comment ID #: 3-10)]	Accepted
1-344	A	19:26	24:2	Section 1.5 lacks any clear conclusions and themes. Suggest at the very least trying to answer "what is the cost-benefit" of moving between hierarchies of models. [Govt. of United States of America (Reviewer's comment ID #: 2023-28)]	Rejected. The suggested changes would not increase clarity or brevity.
1-345	A	19:26		Regarding sections 1.4 and 1.5, which highlight progress in understanding and modeling of climate. It might be worth discussing the growing gap between the two: Held, IM, The gap between simulation and understanding in climate modeling, Bull. Amer. Meteorol. Soc., 86, 1609-1614. Specifically, while progress in simulation has arisen from increased computing power and increasingly complex models, this does not always lead to progress in understanding. [Brian Soden (Reviewer's comment ID #: 245-1)]	Noted. This is a rather philosophical topic, whose discussion would exceed the page length dedicated to this chapter.
1-346	A	19:30	19:43	it would be appropriate to mention already here (before sect. 1.5.2) the passage to models from prescribed to interactive nebulosity. [Govt. of France (Reviewer's comment ID #: 2010-16)]	Rejected. Although this comment is regarded with sympathy, the section 1.5.2 is entirely about cloud modelling and evolution, which already constitutes a significant focus on these processes.
1-347	A	19:30	19:43	it would be appropriate to mention already here (before sect. 1.5.2) the passage to models from prescribed to interactive nebulosity. [Robert Kandel (Reviewer's comment ID #: 123-12)]	Same answer as 1-347
1-348	A	19:31	19:31	Change "driven" to "enabled". [David Parker (Reviewer's comment ID #: 195-37)]	Rejected. Both terms are correct, but nuance provided by "driven" is intentional.
1-349	A	19:49		"More realistic" is too subjective. Suggest providing an illustrative example that provides some degree of quantification. [Govt. of United States of America (Reviewer's comment ID #: 2023-29)]	This relates to the NWP application of the models, as mentioned in the preceding sentence. Clarified.

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1-350	A	20:5	20:6	"cannot be represented": explain why not. [Ileana Blade (Reviewer's comment ID #: 22-32)]	Accepted. Sentence will be clarified.
1-351	A	20:27	20:28	It should be better explained the meaning of "one-column" and "two-column" approach. [Tiziano Colombo (Reviewer's comment ID #: 46-1)]	Accepted. This will be clarified.
1-352	A	20:31	20:31	"decay": slow-down? [Ileana Blade (Reviewer's comment ID #: 22-33)]	Accepted.
1-353	A	20:34	20:34	Change "ensemble" to "ensembles". [David Parker (Reviewer's comment ID #: 195-38)]	Accepted.
1-354	A	20:36	22:11	The content of this section (1.5.2) should be shortened, focused and updated. [Sandrine Bony (Reviewer's comment ID #: 25-1)]	Taken into account. An effort is made to reorder the section, and provide clearer motivation. However updating cannot exceed the mandate given to this chapter, and must concern pre-TAR science.
1-355	A	20:36		Regarding section 1.5.2, it seems a little awkward to include cloud feedbacks in a discussion of progress in climate science for obvious reasons. The section begins by describe the evolution of cloud representation in climate models, discusses the increased observational data available for testing models and concludes by recognizing the lack of progress that has been made in reducing the range of model-predicted cloud feedbacks. Perhaps it would be useful to contrast the progress in modeling cloud feedback with that from other feedbacks, such as water vapor, for which clear discernable progress has been made and confidence in these feedbacks has increased. One could argue that the lack of progress in cloud feedbacks, compared to water vapor, is that water vapor feedback is (1) relatively simply, (2) robust acrosss models and (3) robust across time scales in observations. Whereas cloud feedback is much more complex, highly variable from model to model, and cloud variability does not behave consistently across time scales. Also, one area of progress that has been made in cloud feedback since AR4 which is not currently mentioned is the identification of low clouds as the primary contributor to the uncertainty in model-simulated cloud feedback. See section 8.6.3, specifically Webb et al. (2006) and Bony and Dufresne (2005). [Brian Soden (Reviewer's comment ID #: 245-4)]	Taking into account partially. The aim of this section is precisely to provide an example of the difficulties which the advance of science may face. The Section will point to Chapter 8, but no recent material can be covered here.
1-356	A	20:43	20:43	"transport of radiation": transfer ? [Ileana Blade (Reviewer's comment ID #: 22-41)]	See comment below
1-357	A	20:43		Delete "the transport of" [Govt. of United States of America (Reviewer's comment ID #: 2023-30)]	Accepted
1-358	A	20:49	20:49	Sundquist' should be 'Sundqvist' [Jón Egill Kristjánsson (Reviewer's comment ID #: 136-10)]	Accepted.

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1-359	A	21:5	21:11	This paragraph is a bit confusing and the sentences seem out of order. The sentence on clouds and albedo (line 9) and the simple estimate of temperature change based on albedo changes should come first. The sentence about satellite measurements seems disconnected from the rest. Also, does the estimation in line 6 refer just to the short-wave radiative forcing? It seems really high. Is there a reference for that? And shouldn't an estimate for the (compensating) longwave radiative forcing be included to balance the statement, rather than just mentioned in passing ("clouds can also contribute .. to the ... greenhouse effect") ? I also suggest changing "changes in cloud cover" to "a decrease or increase in cloud cover" to make the sentence more clear ("double or halve"). [Ileana Blade (Reviewer's comment ID #: 22-34)]	Accepted. Some reordering of the whole section will be carried out.
1-360	A	21:7	21:7	Change "measurement" to "measurements" [David Parker (Reviewer's comment ID #: 195-39)]	Accepted
1-361	A	21:8	21:8	Delete "reliable". [David Parker (Reviewer's comment ID #: 195-40)]	Another adjective will be used
1-362	A	21:8		"Satellite measurements…and Suomi, 1971)." This line breaks up the discussion with regard to simple calculations of the radiative effects of cloud and should be removed. [Richard Allan (Reviewer's comment ID #: 3-11)]	Agreed. See comment above
1-363	A	21:9	21:9	According to ERBE data, the Earth reflects about 100 W m-2 of incoming solar radiation (30%) and shortwave cloud forcing is about 50 W m-2. Hence, clouds are responsible for about half of the Earth's albedo, not 'two-thirds'. For references, see, e.g., Harrison et al. (1990: JGR). [Jón Egill Kristjánsson (Reviewer's comment ID #: 136-11)]	The intention here is to provide orders of magnitudes.Sentence has been modified..
1-364	A	21:10	21:10	1% of the current 30%? [David Parker (Reviewer's comment ID #: 195-41)]	Will be clarified
1-365	A	21:10		"... albedo, which is about 30%." 30% of what? [Sabine Wurzler (Reviewer's comment ID #: 296-1)]	Of the incoming solar radiation. Will be clarifies
1-366	A	21:14	21:14	one might even write "must depend strongly on cloud feedbacks". [Govt. of France (Reviewer's comment ID #: 2010-17)]	Accepted
1-367	A	21:14	21:14	One might better write "MUST depend strongly on cloud feedbacks". [Robert Kandel (Reviewer's comment ID #: 123-13)]	Accepted
1-368	A	21:20	21:21	Add Manabe and Wetherald 1975 to reference list. [Govt. of United States of America (Reviewer's comment ID #: 2023-31)]	Accepted
1-369	A	21:25	21:25	Surely the authors meant to say "cloud feedback properties" rather than "cloud optical properties". Uncertainties in cloud optical properties (e.g., single scattering albedo, phase function, extinction efficiency factor) are relatively small and therefore of little consequence, whereas feedback related uncertainties are significant.	Another adjective will be used

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				[Andrew Lacis (Reviewer's comment ID #: 138-3)]	
1-370	A	21:30	21:30	It is not clear what is meant by 'in contrast to the approach which Senior and Mitchell (1993) followed'. Wherein lies the contrast? [Jón Egill Kristjánsson (Reviewer's comment ID #: 136-12)]	Accepted: clarification introduced
1-371	A	21:30	31:30	which" should be "that [Ileana Blade (Reviewer's comment ID #: 22-35)]	This sentence will change in response to previous comment.
1-372	A	21:31	21:32	Analysis of coupled model simulations for AR4 also indicate that cloud feedback remains the largest source of uncertainty in the current generation of models. See section 8.6.3, specifically Held and Soden (2006). [Brian Soden (Reviewer's comment ID #: 245-2)]	Noted. A link forward to Chapter 8 will be introduced.
1-373	A	21:34	21:34	Insert the word "further" between "of" and "constraining". [Govt. of Australia (Reviewer's comment ID #: 2001-128)]	Agreed
1-374	A	21:36	21:37	I believe that "decadal" could be added to the list of "seasonal or interannual time scales" as there has been a great deal of recent attention towards the decadal changes in ERBE and ISCCP data sets, although with little progress in understanding the cause of the decadal variability. [Brian Soden (Reviewer's comment ID #: 245-3)]	Agreed
1-375	A	21:44		Should the acronyms HIRS and SSM/I be spelled out as ISCCP and ARM are? [Richard Allan (Reviewer's comment ID #: 3-12)]	Agreed
1-376	A	22:4	22:11	These lines could be deleted, as it is not clear that the developments will result in significant progress (last sentence) and this approach is in any case covered in Chapter 8. The present chapter is supposed to be a historical overview. [Adrian Simmons (Reviewer's comment ID #: 242-20)]	Agreed. Will be replaced by a link to Chapter 8
1-377	A	22:21		The slab models omitted all CHANGES in ocean dynamics. [Govt. of United States of America (Reviewer's comment ID #: 2023-32)]	Agreed
1-378	A	22:24	22:28	Change to "… both the atmospheric and oceanic components THEMSELVES have undergone significant IMPROVEMENTS". Delete the reference to cloud representation (why mention just this one aspect? The reference to Section 5.1 is wrong anwyay). [Ileana Blade (Reviewer's comment ID #: 22-36)]	Agreed
1-379	A	22:24	:28	Is this statement really true? There are still questions of whether coupled models have improved our climate modeling capabilities. [Govt. of United States of America (Reviewer's comment ID #: 2023-33)]	The coupled models have at least improved our understanding of the climate system.
1-380	A	22:26	22:26	leap' should be 'leaps' [Jón Egill Kristjánsson (Reviewer's comment ID #: 136-13)]	Agreed
1-381	A	22:28	22:28	Replace "Section 1.5 with "Section 1.5.2". 15 1-15 129 [Govt. of Australia (Reviewer's comment ID #: 2001-13)]	This quotation is suppressed (see answer to question I-378

No.	Batch	Page:line From	Page:line To	Comment	Notes
1-382	A	22:28	22:28	modification' should be 'modifications' [Jón Egill Kristjánsson (Reviewer's comment ID #: 136-14)]	Agreed
1-383	A	22:29	22:29	also has' should be 'has also' [Jón Egill Kristjánsson (Reviewer's comment ID #: 136-15)]	Agreed
1-384	A	22:35	22:35	Add the word "momentum" in between "energy" and "or fresh water". Insert a comma after energy. [Govt. of Australia (Reviewer's comment ID #: 2001-130)]	Agreed
1-385	A	22:39		Add Manabe and Stouffer 1988 to flux adjustment list Sausen et al and M+S developed flux adjustments are the same time. [Govt. of United States of America (Reviewer's comment ID #: 2023-34)]	Agreed
1-386	A	22:39	:42	Change flux corrections to flux adjustments. This is the common usage of the term. [Govt. of United States of America (Reviewer's comment ID #: 2023-35)]	Both terminologies are being used in the litterature. And are not absolutely synonimous.
1-387	A	22:42	22:42	Or was it the Hadley Centre? Please check – it did the same about the same time. [Govt. of United Kingdom (Reviewer's comment ID #: 2022-3)]	It has been checked.
1-388	A	22:43	22:44	"in spite of": not clear. Was the drift fixed? If so, change sentence to: "having eliminated the persistent drift that affected many of its early simulations". [Ileana Blade (Reviewer's comment ID #: 22-37)]	Clarification is provided
1-389	A	22:44	23:2	The problematic nature of flux adjustments is well known, and in simulations of future climate there is generally more confidence in models without them than in models that have flux corrections. For instance, if a model has huge flux corrections, then those will be kept constant as the climate evolves, which puts a severe constraint on the model's ability to respond appropriately to the changing climate. With this in mind, the sentence starting with "One may argue that the best ....." seems rather exaggerated. [Jón Egill Kristjánsson (Reviewer's comment ID #: 136-16)]	The corresponding sentence has been rephrased.
1-390	A	22:48	:57	Need to add reference and discussion from Stouffer and Dixon 1998. They develop a nice framework for discussing the initialization problem in AOGCMs. [Govt. of United States of America (Reviewer's comment ID #: 2023-36)]	Other references to GFDL work have been added. This one would be slghtly out of context.
1-391	A	22:57	23:2	The point of that last part of the sentence is not clear, and the first part of the sentence is too obvious. If there is some question as to how the models achieved the lack of drift then it should be clearly stated not this enigmatic "one may argue". [Ileana Blade (Reviewer's comment ID #: 22-38)]	The corresponding sentence has been rephrased
1-392	A	22:57	23:2	Isn't an ad hoc tuning of radiative parameters a form of "flux adjustment"? If so, this sentence should be modified to indicate this fact. [Govt. of United States of America (Reviewer's comment ID #: 2023-37)]	The corresponding sentence has been rephrased.
1-393	A	23:7	23:7	Change "statistical" to "actual".	Accepted

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				[David Parker (Reviewer's comment ID #: 195-42)]	
1-394	A	23:12	23:12	"do not depend on initial conditions": not in the way short-term IVP depend on on initial conditions maybe, but, as explained later (line 52), different initial conditions yield different climate projections, so this "do not depend" needs to be nuanced. [Ileana Blade (Reviewer's comment ID #: 22-39)]	Clarified
1-395	A	23:12		Add "so strongly" after "second kind do not depend". There are cases of multiple equilibria arising from different initial conditions in climate models. Eq. M+S 1988. [Govt. of United States of America (Reviewer's comment ID #: 2023-38)]	Clarified
1-396	A	23:24	23:26	Amend text to "…(1989) who used documented differences among model simulations in their representation of cloud feedback to show how…" [David Parker (Reviewer's comment ID #: 195-43)]	Partly accepted
1-397	A	23:24		Model intercomparison dates back some years before 1989. It was one of the successes of GARP, which evolved into the WCRP. [Adrian Simmons (Reviewer's comment ID #: 242-21)]	This section is mostly on coupled models. But references to WCRP will be provided;
1-398	A	23:24		More generally, absence of reference to GARP, and FGGE in particular, is particularly unfortunate, as there are important references elsewhere to the very real improvement in the atmospheric observing system (serving both NWP and climate) put in place by late 1978 for FGGE in 1979. Some discussion of current institutional arrangements other than that of IPCC (WCRP, GCOS, ...) should also be given. Something on the origins of general circulation modelling would also be appropriate. Appearance of the name Smagorinsky would not go amiss. NCAR gets a mention as an innovatory modelling institutution but not GFDL. [Adrian Simmons (Reviewer's comment ID #: 242-22)]	See preceding comment.
1-399	A	23:43	23:43	delete "remaining" [Ileana Blade (Reviewer's comment ID #: 22-40)]	Accepted
1-400	A	24:0	25:	This section specifies when and where the government plenaries for the SAR (Madrid 1995) and TAR (Shanghai 2001) were held, but not the FAR. For consistency add the date and place of the FAR. By the same token, the report identifies Bert Bolin and John Houghton as the leadership for the FAR, but does not identify the leadership of the SAR and TAR. [Govt. of United States of America (Reviewer's comment ID #: 2023-39)]	Accepted
1-401	A	24:4		The first part of this point traces a sketch of the treatment of uncertainties in the previous IPCC reports that is at times more confusing than illuminating. Instead of collecting the ways in which these issues were handled (or not handled at all) previously it would be better to just express the evolution in the ideas in this field and how it became more important with the years to get more precise about the uncertainties as a fundamental ingredient of our forecasts.	Rejected, the flow works as is.

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				[Govt. of Spain (Reviewer's comment ID #: 2019-59)]	
1-402	A	24:18	:19	The IPCC syntheses have inspired scientific research leading to new findings, so point to one or two prime examples from the first three reports. This could be incorporated into the discussion of findings and oversights for each of the three reports on p. 24-26. Include a paragraph on p. 25, before line 12, that would describe how each IPCC report stimulated new research, ending with three or four nuggets of how the Fourth Assessment Report could affect the course of climate change science in the near future. [Govt. of United States of America (Reviewer's comment ID #: 2023-40)]	Rejected, this is already taken inot account with the overall structure of the chapter which picks examples where IPCC has had impact.
1-403	A	24:29	24:29	Insert the words "part of" in between "is" and "the". [Govt. of Australia (Reviewer's comment ID #: 2001-131)]	Taken into account, fixed otherwise
1-404	A	24:37	24:37	Change to "The WG 1 FAR …" The FAR consisted of three volumes, and it is incorrect describe it as consisting of only WG1's report. [Lenny Bernstein (Reviewer's comment ID #: 20-45)]	Taken into account, fixed otherwise
1-405	A	24:37		Change to "The WG1 FAR …" The FAR consisted of three volumes, and it is incorrect describe it as consisting of only WG1's report. [Govt. of United States of America (Reviewer's comment ID #: 2023-41)]	Taken into account, fixed otherwise
1-406	A	24:42		Reference to section 7.1 is lengthy and on line 46. [Govt. of United States of America (Reviewer's comment ID #: 2023-42)]	Taken into account, fixed otherwise
1-407	A	24:45	24:45	"The latter two areas highlight the advance": uncompress, so the reader does not have to go back to dig out what those 2 areas might be. [Ileana Blade (Reviewer's comment ID #: 22-42)]	Rejected, OK as is.
1-408	A	25:21	25:24	Syntax problem/editing mistake with this sentence [Ileana Blade (Reviewer's comment ID #: 22-43)]	Taken into account, fixed otherwise
1-409	A	25:41	25:41	except for that DUE TO IMPACT ON cirrus clouds (not clear otherwise) [Ileana Blade (Reviewer's comment ID #: 22-44)]	Taken into account, fixed otherwise
1-410	A	26:1	26:1	The statement here is incorrect. The TAR Technical Summary says that sensitivity is 'likely' in the 1.5-4-5C range, although this can't be found anywhere in the underlying chapters, and most people are not aware of the statement. But strictly speaking there was a confidence statement in the TAR. [Reto Knutti (Reviewer's comment ID #: 133-16)]	Rejected, the TS does not stand alone and is NOT a primary resource, all of its material must be in the chapters.. The TS must be corrected.
1-411	A	26:7	26:7	Syntax problem/editing mistake with this sentence [Ileana Blade (Reviewer's comment ID #: 22-45)]	Accepted
1-412	A	26:7	26:7	Change "is reported as" to "using". [David Parker (Reviewer's comment ID #: 195-44)]	Accepted
1-413	A	26:17	27:11	Box 1.1: This is similar, but not identical to, Box TS.1.1 in the Technical Summary. They should be made the same. I also find them quite confusing, especially the discussion of	Noted. The TS does not stand alone and is NOT a primary resource, all of its

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				the distinction of "likelihood" and "confidence". This discussion should be expanded with [John Hunter (Reviewer's comment ID #: 112-30)]	material must be in the chapters.. The TS must be corrected.
1-414	A	26:17		Treatment of Uncertainties in the Working Group I Assessment. One finds a distinction between "value uncertainty" and "structural uncertainty" that seems to generate the distinction between level of confidence and likelihood of results. It is stated that, like the value and structural uncertainty they are closely linked because it does not make sense to express a low confidence that an event is very likely. Though the distictions made here are undoubtedly useful in certain situations as a way to classifying the sources of uncertainty it would be better to emphasise properly that all uncertainties are in the last analysis expressable as probabilities. And all the information and better judgement available at a given moment on a given question is capable of being couched in terms of probabilities, in the ideal case as a probability distribution function (pdf). This unifying approach serves to clarify the ideas in the box. Thus what is called there the likelihood would be better seen as a centrality parameter of the pdf. For example if the pdf refers to occurrence probabilities of an event we say that the event is very likely if its pdf is something similar to a beta (15 , 2) curve for instance, and we say it is very unlikely if the pdf of its occurrence probability is similar to a beta (2, 15) curve. What is called in the box the level of confidence refers to a dispersion measure of the underlying pdf. Thus we assign greater levels of confidence to the more peaking pdfs and less levels of confidence to the more flattened out ones. The limit case of a uniform distribution on [0, 1] would be the extreme cases of lack of confidence or information in the occurrence probability. In order for this scheme to reflect our true beliefs about the phenomenon we are analysing we should factor in all the uncertainties we know of into the pdf, so that all types of uncertainty should lead to a more flattened out pdf, as should be if the pdf is to represent our final assessment on the probabilies of occurrence. We can see then that it does not make sense not only to express a low confidence that an event is very likely, but also to express a low confidence that an event is very unlikely, since both "very likely/unlikely" imply peaking pdf's of the occurrence probability. We see that with pdf's we can express everything we want regarding both likelihood and level of confidence, so this distinction is in last analysis a little bit artificial if not properly understood. And anyway the final goal, a properly assessed pdf should not be loose sight of. [Govt. of Spain (Reviewer's comment ID #: 2019-60)]	We agree with the reviewer that the treatment of probabilities is not always consistent. We have revised Table 1-1 to reflect the instructions to authors and the intent and applicability of uncertainty language in the AR4 WGI. This is as far as Chapter 1 can go. Larger issues must be addressed to the co-chairs and CLAs of the other chapters. The consistent use of PDFs would indeed make all this redundant and as you can see, PDFs are being used in many places. .
1-415	A	26:44	27:3	Delete. It is a repetition	We agree with the reviewer that the

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				[VINCENT GRAY (Reviewer's comment ID #: 88-99)]	treatment of probabilities is not always consistent. We have revised Table 1-1 to reflect the instructions to authors and the intent and applicability of uncertainty language in the AR4 WGI. This is as far as Chapter 1 can go. Larger issues must be addressed to the co-chairs and specific CLAs of the other chapters where probability is used.
1-416	A	26:46		Terminology box: the medium confidence=about 5 out of 10 chance could be interpreted as "we don't know" and the low confidence=about 2 out of 10 chance as "an 8 out of 10 chance that it is not true so it is probably wrong. 13 1-13 13 [Richard Allan (Reviewer's comment ID #: 3-99)]	We agree with the reviewer that the treatment of probabilities is not always consistent. We have revised Table 1-1 to reflect the instructions to authors and the intent and applicability of uncertainty language in the AR4 WGI. This is as far as Chapter 1 can go. Larger issues must be addressed to the co-chairs and CLAs of the other chapters. The consistent use of PDFs would indeed make all this redundant and as you can see, PDFs are being used in many places. .
1-417	A	26:46		Medium confidence is a coin flip? 5 out of 10 chances of being right is mediium confidence?? What does correct mean? [Dennis Hartmann (Reviewer's comment ID #: 100-4)]	The meaning of "correct" should always be clear from a statement or its context when the uncertainty language is used.
1-418	A	26:48	27:3	I think it is really unfortunate and confusing to have chapter 2 using this alternative scheme regarding the degree of scientific understanding as there is not, in sum, a good correlation between the term used and the importance of the uncertainty for the problem at hand. For example, having a low understanding of contrails really does not matter much to the outcome of everything, yet some critics like to say we have to have good understanding of everything before we can understand everything. [Michael MacCracken (Reviewer's comment ID #: 152-251)]	This comment should be addressed to Chapter 2. There is no specific suggestion for Chapter 1.
1-419	A	27:5	27:11	Chapter 9 uses also 'highly likely' and 'more likely than not', please make sure the table is complete and consistent with the one given in the Technical Summary [Reto Knutti (Reviewer's comment ID #: 133-15)]	We agree with the reviewer that the treatment of probabilities is not always consistent. We have revised Table 1-1

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					to reflect the instructions to authors and the intent and applicability of uncertainty language in the AR4 WGI. This is as far as Chapter 1 can go. Larger issues must be addressed to the co-chairs and CLAs of the other chapters. This table will be the source of the TS table.
1-420	A	27:7	27:8	This Table is no more than guesswork, so it gives a spurious impression of accuracy. It is better to use qualitative terms such as "possible", "might"' "could" etc [VINCENT GRAY (Reviewer's comment ID #: 88-100)]	We disagree. The table and usage is founded in efforts to put quantitative ranges on uncertainty.
1-421	A	27:10	27:11	There should be no exceptions. Delete last sentence [VINCENT GRAY (Reviewer's comment ID #: 88-101)]	Sorry, but we disagree.
1-422	A	31:23		Incorrect reference. Harriss's web site gives:Harriss, R.C., K. Bartlett, S. Frolking, and P. Crill, 1993, Methane emissions from northern high-latitude wetlands, in R.S. Oremland (ed.), Biogeochemistry of Global Change, N.Y.: Chapman & Hall, pp. 449-486. [Govt. of United States of America (Reviewer's comment ID #: 2023-43)]	Thanks, this STILL needs to be corrected in the fianl text.
1-423	A	34:2	34:2	Insert " McIntyre, S and McKitrick, R, 2003. Corrections to the Mann et al (1998) proxy data base and northern hemispheric average temperature series ." Energy and Environment" Vol 14, pages 751-771" [VINCENT GRAY (Reviewer's comment ID #: 88-102)]	No, this is inappropriate reference here. If appropriate (it is post-TAR) it will be dealt with in other chapters.
1-424	A	34:2	34:2	Insert "McKitrick, R and Michaels, P.J 2004, A test of corrections for extraneous signals in gridded surface temperature data . "Climate Research" Vol 26, pages 159-173" [VINCENT GRAY (Reviewer's comment ID #: 88-103)]	No, this is inappropriate reference here. If appropriate (it is post-TAR) it will be dealt with in other chapters.
1-425	A	34:52	34:52	Insert "Peterson, T.C., 2003, Assessment of Urban Versus Rural in Situ Surface Temperatures in the Contiguois United States. "Journal of Climate" Volume 16, pages 2941-2959" [VINCENT GRAY (Reviewer's comment ID #: 88-104)]	No, this is inappropriate reference here. If appropriate (it is post-TAR) it will be dealt with in other chapters.
1-426	A	36:33	36:33	Sundquist' should be spelled 'Sundqvist' [Jón Egill Kristjánsson (Reviewer's comment ID #: 136-17)]	Thanks, this STILL needs to be corrected in the fianl text
1-427	A	37:37	:43	The direct effect of solar variation, through changes in total irradiance, is known to be small. Thus page 1-13, at lines 37-43, notes that if solar variation is to be a significant contributor to observed variations in global temperature, it must be through "unknown large feedbacks in the climate system," such as effects on cloud nucleation. It goes on to note that mechanisms by which such indirect solar effects are at this point highly	Misplaced comment, it refers to 1:37-43. This is indeed true as the Milankovitch cycles somehow trigger larger cahnges in greenhosue gases. But here is not the place to expand on

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				speculative and require more research. What is missing in this section is any acknowledgment of the large body of evidence that SOME kind of indirect mechanisms must be at work, given the numerous findings of strong correlations between solar activity and global temperature in the historic and geological records. [Govt. of United States of America (Reviewer's comment ID #: 2023-44)]	this and we cannot expand the chapter.
1-428	A	38:0		Question 1.1, Figure 1: the Figure is taken from the TAR. However, we believe that several of these fundamental numbers given on this figure are not very realistic and might need revision: There is evidence that the longwave back radiation is 20 Wm-2 higher than given in this Figure: Wild et al. 2001, J. Climate, 14, 3227-3239, estimated the longwave back radiation to be close to 344 Wm-2, based on a combination of models and direct observations at the surface which were not available at the time of the first publication of Figure 1.1. The value of 324 Wm-2 given in that Figures lies also outside the range of the values calculated by the various GCMs participating in the IPCC AR4 control experiments, which we determined to range form 333 to 351 Wm-2. On the other hand, we believe that the atmospheric shortwave absorption (67 Wm-2) is underestimated in the Figure, resulting in a surface absorption value which is too high (168Wm-2).We estimated the absorption at the surface to be considerably lower, around 154 Wm-2 (Wild et al. 1998, Climate Dynamics, 14, 853-86, Wild 2005, Geophys. Res. Lett, 32, doi:10.1029/2005GL022421). In a recent study (Wild et al 2005, J. Geophys. Res. (in press), we estimated a clear sky atmospheric absorption (71Wm-2) which is already higher than the all sky value given in this Figure (67 Wm-2), and clouds are likely to increase this value further. In Wild et al. 1998 and Wild 2005 we estimated the most realistic value for solar energy absorbed by the (all sky) atmosphere to be close to 81 Wm-2, in close agreement with recent estimates obtained in other groups (e.g. V. Ramanathan, personnal communication). [Martin Wild (Reviewer's comment ID #: 288-4)]	Rejected. After discussing this with experts from Chapter 6, we determined that Wild does indeed have some good solid numbers for part of the figure. But we can't change part of the figure and keep the rest the same or the numbers won't add up. The recommendations from the experts in Chapter 6 is to reject this comment and stay with the Kiehl and Trenberth (1997) numbers. The numbers are really only illustrative anyway. To make this point, the caption to Figure 1 of FAQ 1.1 has been changed to say Estimates of the Earth's …
1-429	A	38:1	39:24	Delete this whole paragraph. What , on earth, is this doing here? It does not belong to a Chapter dealing with history. I am not sure it ought to belong anywhere. It is not part of the purpose of the IPCC [VINCENT GRAY (Reviewer's comment ID #: 88-105)]	Rejected. The FAQ is basic background information that needs to be somewhere. Chapter 1 is the best place for it.
1-430	A	38:3		Flow would be improved if word "system" was used only once in this sentence, and phrase "highly complex' removed, e.g.: The climate system consists of five components, atmosphere, hydrosphere, cryosphere, land surface, and biosphere, as well as the interactions between these. 131 1-131 94	Accepted.

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				[David Wratt & David Fahey (Reviewer's comment ID #: 67-105)]	
1-431	A	38:5	38:5	What does "in a narrow sense" mean? [Melinda Marquis (Reviewer's comment ID #: 162-55)]	Accepted. "Narrow sense" removed changed to something clearer.
1-432	A	38:8	38:8	Consider changing "classical" to something else, e.g., "typical." [Melinda Marquis (Reviewer's comment ID #: 162-56)]	Accepted.
1-433	A	38:9	38:9	Since the questions will be published separaely and read widely by the public terms like forcings should be defined so that the start of the new sentence should read: External forcings are things that afffect the climate, but…. [Wilmer Anderson (Reviewer's comment ID #: 5-1)]	Accepted.
1-434	A	38:10	38:11	Couldn't one argue that CO2 emissions could change in a different climate? [Ileana Blade (Reviewer's comment ID #: 22-46)]	Rejected. In a very strict sense the reviewer is correct. For example, a warmer climate would have different CO2 uptake in the oceans. But to a first approximation, CO2 is a forcing that impacts climate.
1-435	A	38:11	38:11	Solar radiation is the driving force of the climate system." This could be taken out of context. Consider changing "the driving force" to "a driving force. [WG1 TSU (Reviewer's comment ID #: 285-1)]	Accepted.
1-436	A	38:11		Suggest the following changes to motivate 'change' in radiation and aid in clarity. " Incoming solar radiation is the driving force of climate change. Climate responds to the energy balance between incoming and outgoing radiation. There are three fundamental ways to change the radiation balance....." [David Wratt & David Fahey (Reviewer's comment ID #: 67-1)]	Accepted.
1-437	A	38:12	38:15	Sentence should read: There are three fundamental ways the radiation balance of the earth changes: 1) by changes in the incoming solar radiation (e.g. by changes in the earth's orbit or in the sun itself), 2)by changes in the cloud cover, aersols, or land cover, and 3) by changes in the long-wave length back radiation (e.g. by changes in the greenhouse gas concentration). As written this sentence reads as though man can change the earth's orbit or the solar output etc. [Wilmer Anderson (Reviewer's comment ID #: 5-2)]	Accepted.
1-438	A	38:15	38:15	Add "or by altering internal thermodynamics" in the brackets after "(e.g. by changing the greenhouse gas concentrations)." [Govt. of Australia (Reviewer's comment ID #: 2001-132)]	Accepted.
1-439	A	38:15	38:15	"…altering the long-wave radiation." Isn't the short-wave radiation also altered? [Melinda Marquis (Reviewer's comment ID #: 162-57)]	Accepted. It is altered by changing the amount reflected and that point is now made clear.

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1-440	A	38:15		The use of 'back' will not be understood by most readers. Also suggest changing the use in the figure. [David Wratt & David Fahey (Reviewer's comment ID #: 67-2)]	Accepted. Back has been changed to outgoing.
1-441	A	38:20	38:20	FAQ1.1: Consider rewording the introductory phrase. How can something (energy) that is outside the atmosphere be reaching the Earth? [Melinda Marquis (Reviewer's comment ID #: 162-53)]	Accepted.
1-442	A	38:21	38:21	Sentence should read: …and the average amount of energy incident on an imaginary sphere just outside the earth's atmosphere is … The term a level surface can be misunderstood. [Wilmer Anderson (Reviewer's comment ID #: 5-3)]	Accepted.
1-443	A	38:21	38:21	"average …. on a level surface": unclear (to the inexpert reader) what the factor of 4 accounts for. Expand explanation a little .. [Ileana Blade (Reviewer's comment ID #: 22-47)]	Accepted.
1-444	A	38:21	38:21	Two problems here--first, it needs to be said that the average amount of energy is calculated by averaging over the day and year, and second it needs to be said, somehow, that this level surface is above the top of the atmosphere. [Michael MacCracken (Reviewer's comment ID #: 152-252)]	Accepted.
1-445	A	38:21		The concept of one quarter will not be understood by most readers. Suggest changing to " …about 1370W. The average amount of energy incident on Earth's surface is one quarter of this value (…) with greater values in the tropics than at the poles." [David Wratt & David Fahey (Reviewer's comment ID #: 67-3)]	Accepted.
1-446	A	38:22	38:22	Sentence should read: Averaged over the earth's surface about thirty percent… [Wilmer Anderson (Reviewer's comment ID #: 5-4)]	Accepted.
1-447	A	38:22		It should be stated that the energy incident on the surface of the Earth is one quarter of the 1370 Wm-2 intercepted by the Earth's circular cross-section because the surface area of a sphere is four times the area of a circle [Richard Allan (Reviewer's comment ID #: 3-15)]	Accepted.
1-448	A	38:25		"atmosphere: aeorosols." implies the whole sentence leads to "aerosols". How about "atmosphere, aerosols." or …atmosphere (aerosols)." 14 1-14 14 [Richard Allan (Reviewer's comment ID #: 3-15)]	Accepted.
1-449	A	38:26	38:26	Sentence should read: Rain typically clears aersols… [Wilmer Anderson (Reviewer's comment ID #: 5-5)]	Accepted.
1-450	A	38:27	38:27	Change "sulphate containing" to "sulphate-containing". The spelling of "sulphate" is English here, American elsewhere. [David Parker (Reviewer's comment ID #: 195-45)]	Accepted.
1-451	A	38:28	38:28	Sentence should read: …these aersols influence the climate…	Accepted.

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				[Wilmer Anderson (Reviewer's comment ID #: 5-6)]	
1-452	A	38:29	38:30	"Major volcanic eruptions … even years." Doesn't this depend on the eruption? Is true of Pinatubo, but not necessarily true of all major eruptions, right? [Melinda Marquis (Reviewer's comment ID #: 162-58)]	Accepted.
1-453	A	38:30	38:30	Human activities ALSO affect [Ileana Blade (Reviewer's comment ID #: 22-48)]	Accepted.
1-454	A	38:36	38:36	Sentence should read: …outgoing long-wavelength thermal radiation … [Wilmer Anderson (Reviewer's comment ID #: 5-7)]	Accepted.
1-455	A	38:37	38:39	Delete first half of sentence that starts That is the heat energy … This sounds like the black body radiation form the earth is due to fire. Sentence should simply read: The warmer and object, the more heat it radiates. [Wilmer Anderson (Reviewer's comment ID #: 5-8)]	Accepted.
1-456	A	38:37	38:37	Change "That is the" to That is, like the" 325 1-325 253 [Michael MacCracken (Reviewer's comment ID #: 152-8)]	Rejected due to the previous change in response to comment 1-455.
1-457	A	38:38		The example of a fire is not so good for longwave radiation since this emits some visible light. How about an iron? [Richard Allan (Reviewer's comment ID #: 3-16)]	Rejected because people everywhere have warmed themselves from the IR radiation from a fire.
1-458	A	38:39	38:39	Sentence should read: … a surface must have a temperature around … In addition to the change in grammar This sentence assumes that the emissivity in visible and in the IR are the same. Should this be mentioned? [Wilmer Anderson (Reviewer's comment ID #: 5-9)]	Accepted.
1-459	A	38:43	38:43	Insert "in simple terms" in between "which" and "act". [Govt. of Australia (Reviewer's comment ID #: 2001-133)]	Accepted.
1-460	A	38:49	38:49	Sentence should read: …tend not to cool down as much as clear nights because the clouds radiate ... [Wilmer Anderson (Reviewer's comment ID #: 5-10)]	Accepted.
1-461	A	38:49	38:49	cloudy nights tend to not cool as much as clear night because CLOUDS (not they) radiate … [Ileana Blade (Reviewer's comment ID #: 22-49)]	Accepted.
1-462	A	38:49	38:49	Change "they" to "clouds." [Melinda Marquis (Reviewer's comment ID #: 162-59)]	Accepted.
1-463	A	38:49	38:49	Change "they" to "clouds". [David Parker (Reviewer's comment ID #: 195-46)]	Accepted.
1-464	A	38:49		For clarity suggest changing to '…because clouds radiate…" 115 1-115 4 [David Wratt & David Fahey (Reviewer's comment ID #: 67-46)]	Accepted.
1-465	A	38:51	38:51	Consider adding "in the atmosphere" after (to modify) "carbon dioxide."	Accepted.

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				[Melinda Marquis (Reviewer's comment ID #: 162-54)]	
1-466	A	38:52	38:52	this increase is known to be in large part due to [Govt. of France (Reviewer's comment ID #: 2010-18)]	Accepted.
1-467	A	38:52	38:52	this increase is known to be in LARGE part due to [Robert Kandel (Reviewer's comment ID #: 123-14)]	Accepted.
1-468	A	38:55	38:57	This applies to the annual average and even more so to the equinox seasons; may be that should be mentioned. One might also mention that at solstice, the gradient of incoming solar flux is strong over the winter hemisphere, very weak over the summer hemisphere, and this strongly affects dynamics. [Govt. of France (Reviewer's comment ID #: 2010-19)]	Accepted.
1-469	A	38:55	38:57	This applies to the annual average and even more so to the equinox seasons; maybe that should be mentioned. One might also mention that at solstice, the gradient of incoming solar flux is strong over the winter hemisphere, very weak over the summer hemisphere, and this strongly affects dynamics. [Robert Kandel (Reviewer's comment ID #: 123-15)]	Accepted.
1-470	A	39:1	39:1	Sentence should read: …by the release of latent heat and the earth's rotation. [Wilmer Anderson (Reviewer's comment ID #: 5-11)]	Accepted.
1-471	A	39:1	39:1	Insert "in buoyant tropical convection and mid latitude storms" at the end of "circulation is primarily driven by the release of latent heat." [Govt. of Australia (Reviewer's comment ID #: 2001-134)]	Accepted.
1-472	A	39:2	39:2	Can you please try to define "latent heat" for a broad audience? [Melinda Marquis (Reviewer's comment ID #: 162-60)]	Accepted.
1-473	A	39:2	39:2	Figure reference should be Question 1.1, Figure 1. [David Parker (Reviewer's comment ID #: 195-47)]	Accepted.
1-474	A	39:2		see figure 1" -> "see question 1.1, figure 1 [Pedro Ribera (Reviewer's comment ID #: 213-6)]	Accepted.
1-475	A	39:9	39:9	Sentence should read: …are the familiar waves of migrating low and high pressure systems… [Wilmer Anderson (Reviewer's comment ID #: 5-12)]	Accepted.
1-476	A	39:12	39:12	Sentence should read: …amplitude changes with time. [Wilmer Anderson (Reviewer's comment ID #: 5-13)]	Accepted.
1-477	A	39:15	39:15	Sentence should read: …or ocean influence … [Wilmer Anderson (Reviewer's comment ID #: 5-14)]	Accepted.
1-478	A	39:15		For clarity add comma: '….or ocean, will…" 116 1-116 5 [David Wratt & David Fahey (Reviewer's comment ID #: 67-14)]	Accepted.
1-479	A	39:18	39:18	Insert "the effects of" before "a change in climate forcing".	Accepted.

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				[David Parker (Reviewer's comment ID #: 195-48)]	
1-480	A	39:21	39:21	Insert a new sentence "However, the evaporation of water from the surface requires energy and has a cooling effect." after "warming." and before "As illustrated" [Govt. of Australia (Reviewer's comment ID #: 2001-135)]	Rejected. The point is about the amount of water vapor in the atmosphere which may increase. The cooling effect of evaporating this water is very short while the length of time more water vapor may be interacting with IR radiation is huge, so the warming effect will be much much greater than the cooling effect. Ergo, this point shouldn't be confused by a technically correct but minor and only tangentially relevant insertion recommended by the reviewer.
1-481	A	40:3	40:3	What does "in a narrow sense" mean? [Melinda Marquis (Reviewer's comment ID #: 162-61)]	Accepted.
1-482	A	40:3		Suggest changing to 'Climate in a practical sense..' Also suggest deleting leading phrase 'Since climate is made up of weather," since it is largely redundant. 118 1-118 7 [David Wratt & David Fahey (Reviewer's comment ID #: 67-61)]	Accepted.
1-483	A	40:7		Suggest deleting the word 'boundary' since it is not necessary and since it simplifies the thought for the average reader. [David Wratt & David Fahey (Reviewer's comment ID #: 67-8)]	Accepted.
1-484	A	40:8		Suggest deleting 'of the ground' as redundant. [David Wratt & David Fahey (Reviewer's comment ID #: 67-9)]	Accepted.
1-485	A	40:9	40:9	Figure reference should be Question 1.2, Figure 1. [David Parker (Reviewer's comment ID #: 195-49)]	Accepted.
1-486	A	40:9	40:10	Amend text to "…part of climate as convection and storm systems are crucial for transporting energy upward and poleward.". [David Parker (Reviewer's comment ID #: 195-50)]	Accepted.
1-487	A	40:9		Suggest deleting 'the instability in' as unnecessary complexity in this introductory para. [David Wratt & David Fahey (Reviewer's comment ID #: 67-10)]	Accepted.
1-488	A	40:10		"as instability in storm systems are crucial for transporting energy poleward" seems rather an obscure analagy. [Richard Allan (Reviewer's comment ID #: 3-17)]	Accepted.
1-489	A	40:15	40:15	Sentence should read: Using physics based concepts that govern how the atmosphere…	Accepted.

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				[Wilmer Anderson (Reviewer's comment ID #: 5-16)]	
1-490	A	40:18	40:18	Sentence should read: …the initial observations used to start the analysis. [Wilmer Anderson (Reviewer's comment ID #: 5-17)]	Accepted.
1-491	A	40:20		…can (in principle) change the weather pattern…" alternative suggestion: "can in principle change (although not cause) a weather pattern… [Richard Allan (Reviewer's comment ID #: 3-18)]	Accepted.
1-492	A	40:20		Suggest making this example politically neutral by removing specific country references since they are not needed and may be misinterpreted by some of the diverse readership. Suggest changing to '…flapping its wings in one part of the world can, in principle, change the weather patters over a far distant region weeks later. [David Wratt & David Fahey (Reviewer's comment ID #: 67-11)]	Accepted.
1-493	A	40:24	40:24	Sentence should read: Nevertheless, chaos theory does not imply a total lack… The style manual by Strunk and White says you should not start a sentence with the word however, but you can use nevertheless to start a sentence. [Wilmer Anderson (Reviewer's comment ID #: 5-18)]	Accepted.
1-494	A	40:26	40:26	Sentence should read: ... for that region and that period of time. [Wilmer Anderson (Reviewer's comment ID #: 5-19)]	Accepted.
1-495	A	40:27	40:27	Change "Because" to "So while". [David Parker (Reviewer's comment ID #: 195-51)]	Accepted.
1-496	A	40:32	40:32	Change "put different" to "to set the". [David Parker (Reviewer's comment ID #: 195-52)]	Accepted.
1-497	A	40:33	40:33	Add "A La Niña would set different bounds.". [David Parker (Reviewer's comment ID #: 195-53)]	Accepted.
1-498	A	40:35		Suggest changing "Projecting" to "Predicting" since the former is less specific and a derivative of this word is used in the next but one sentence [Richard Allan (Reviewer's comment ID #: 3-19)]	Rejected. Projecting is the more accurate term to use in this case. However, the reviewer makes a good point about using a derivative of that word in the next but one sentence. So the section is now edited to remove that second use of project.
1-499	A	40:36		Suggest completing thought somehow as '…is obviously easly using historical data, yet doing….' [David Wratt & David Fahey (Reviewer's comment ID #: 67-12)]	Accepted.
1-500	A	40:39	40:39	Sentence should read: … of the downward long-wavelength back radiation… [Wilmer Anderson (Reviewer's comment ID #: 5-20)]	Accepted.
1-501	A	40:39		Suggest being clear as '…fundamental changes in Earth's radiation balance, especially…"	Accepted.

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				124 1-124 13 [David Wratt & David Fahey (Reviewer's comment ID #: 67-20)]	
1-502	A	40:40	40:46	for those who would rather not contemplate the smoking-death correlation, one might also mention automobile traffic models that represent flows more or less accurately even though they have no knowledge of an individual's destination [Govt. of France (Reviewer's comment ID #: 2010-20)]	Accepted.
1-503	A	40:43	40:43	Sentence should read: ...of the atmosphere are more predictable than ... [Wilmer Anderson (Reviewer's comment ID #: 5-21)]	Accepted.
1-504	A	40:44		Suggest clarifying thought as: "As an example, changes in the life expectancy for large populations that start or give up smoking can be predicted with greater accuracy than the date of death of a specific person in that population." [David Wratt & David Fahey (Reviewer's comment ID #: 67-14)]	Accepted.
1-505	A	40:51	40:55	Here (and in many places throughout the text), the notion is expressed that "As climate changes, ... the weather is affected". This provides the reader with the wrong impression that "climate" is like a parameter that can be externally imposed and then causes "weather" to change in response. I think this is physically not justified and confuses cause and effect. Instead, e.g. a slow change in radiative forcing will initiate a gradual, consistent change in weather systems (path, size, location, duration, ...) which after several decades will have led the climate system to a new climatic state. Maybe the fact that climate models compute future climatic states, and not future weather, has contributed to the false perception that one could go to a new climatic state and only then ask "How will weather respond to this?". Weather and climate are intertwined, and weather must change consistently due to external forcings to cause climate change - not the other way around. [Nikolai Dotzek (Reviewer's comment ID #: 59-1)]	Rejected. As is now made clear, climate includes a wide variety of factors. Take el Niño for example. El Niño is clearly climate and not weather, and it externally imposes a weather response in coastal Peru.
1-506	A	41:0		There should be a reference to Question 1.1 [Richard Allan (Reviewer's comment ID #: 3-22)]	Noted , but not retained
1-507	A	41:3		Suggest answering the question more directly in the first sentence. For example, 'The greenhouse effect is a warming of our atmosphere caused by the presence of certain trace gases in the atmosphere." 126 1-126 15 [David Wratt & David Fahey (Reviewer's comment ID #: 67-22)]	Noted but not retained
1-508	A	41:9	41:9	Figure reference should be Question 1.3, Figure 1. [David Parker (Reviewer's comment ID #: 195-54)]	Taken into account
1-509	A	41:9		Regarding Section 1.4.6 - I found this whole section dominated by the ENSO discussion, which, to me is somewhat biased. I don't think the idea was to focus on a climate index (or two), but that appears to be the case. There are literally dozens of climate indices. The Antarctic Circumpolar Current and the Indian Ocean Dipole are commonly	Misplaced comment

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				mentioned here in Australia, too. In the end, I felt that this material is best discussed with discussions on climate variability, not air-sea interaction. [Steven Siems (Reviewer's comment ID #: 239-1)]	
1-510	A	41:11	40:13	Suggest deleting the two sentences "The glass walls….of the planet" is unnecessary and potentially confusing to most non-expert readers. [David Wratt & David Fahey (Reviewer's comment ID #: 67-16)]	Rejected . These facts explain the name of the greenhouse effect.
1-511	A	41:11	41:11	Change "increases" to "increase." [Melinda Marquis (Reviewer's comment ID #: 162-62)]	Taken into account
1-512	A	41:19	41:20	Replace the sentence "Instead the greenhouse effect comes from more complex molecules that are much less common." with "The greenhouse effect comes from molecules that have two or more atoms, which are much less common." [Govt. of Australia (Reviewer's comment ID #: 2001-136)]	Rejected. Does not seem to make the sentence more understandable or more accurate.
1-513	A	41:21		…currently are roughly:" seems sloppy; suggest changing to "…currently approximate to: [Richard Allan (Reviewer's comment ID #: 3-20)]	Taken into account
1-514	A	41:21		There are no firm theoretical/computational basis behind the statement on H2O / CO2 60% / 26% RF ratio. According to recent high-resolution line-by-line computations of the monochromatic fluxes of the ERBE and TIGR datasets, based on the exact analytic solution of the Schwarzchild equation, Ferenc Miskolczi in his referred paper found 9% for clear-sky CO2, and only 0.5 C ground temperature rise for 2xCO2. Details in the forthcoming TellusB article. [MIKLOS ZAGONI (Reviewer's comment ID #: 300-5)]	Figures are no longer cited. Forthcoming articles cannot be cited.
1-515	A	41:23	40:23	Sentence should read: ...regions, where the air has a high water vapor content, the greenhouse effect is … [Wilmer Anderson (Reviewer's comment ID #: 5-22)]	Noted but not taken into account
1-516	A	41:24	41:24	Sentence should read: …carbon dioxide or water vapor has only a small direct … [Wilmer Anderson (Reviewer's comment ID #: 5-23)]	Noted but not taken into account
1-517	A	41:25	41:25	Sentence should read: Nevertheless, in cold dry polar ... The style manual by Strunk and White says you should not start a sentence with the word however, but you can use nevertheless to start a sentence. [Wilmer Anderson (Reviewer's comment ID #: 5-24)]	Noted, but not taken into account
1-518	A	41:26	41:26	Sentence should read: …water vapor is much greater. [Wilmer Anderson (Reviewer's comment ID #: 5-25)]	Noted and taken into account
1-519	A	41:28		For clarity, suggest changing 'were' to 'occurred' [David Wratt & David Fahey (Reviewer's comment ID #: 67-17)]	A similar modification has been made
1-520	A	41:30	42:38	Paragraph should be re-written to convey the simple message that the anthropogenic greenhouse effect involves a perturbation to a basically steady-state system in which	Agreed: The message has been simplified

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				carbon is exchanged between reservoirs. [Govt. of Australia (Reviewer's comment ID #: 2001-137)]	
1-521	A	41:30		The word 'regulatory' is a policy word so suggest changing to 'controlling' [David Wratt & David Fahey (Reviewer's comment ID #: 67-18)]	Agreed
1-522	A	41:34	41:34	Change "impact" to "impacts" [David Parker (Reviewer's comment ID #: 195-55)]	This has been rewritten
1-523	A	41:35	41:35	Sentence should read: …Nevertheless in reality, the greenhouse… The style manual by Strunk and White says you should not start a sentence with the word however, but you can use nevertheless to start a sentence. [Wilmer Anderson (Reviewer's comment ID #: 5-26)]	Agreed
1-524	A	41:41		Suggest changing 'strengthen' to 'enhance' to align with definitions in ln 34. [David Wratt & David Fahey (Reviewer's comment ID #: 67-19)]	Rewritten
1-525	A	41:44	41:44	Insert "computer modelling suggests that" in between "Quantitatively," and "the". [Govt. of Australia (Reviewer's comment ID #: 2001-138)]	Not taken into account
1-526	A	41:44	41:46	FAQ 1.3 states that the positive water vapour feeback may be strong enough to *approximately double* the change in the greenhouse effect due to the added carbon dioxide alone. However, the SPM (page 6, lines 14-16) describe this positive feedback as a "40-50% amplification of global mean warming." However, I note that Box 8.1 (Chapter 8, page 47, lines 3-6) states, as FAQ 1.3 does, that this feedback "doubles" the warming: " In General Circulation Models (GCMs) water vapour provides the largest positive radiative feedback (see Section 8.6.2.3): alone it roughly doubles the warming in response to forcing (such as from greenhouse gas increases), while when it is combined with other positive feedbacks (such as from surface albedo) they amplify one another's effects." Probably would be better to present this positive feedback in the same way in all three parts of the report, e.g., for sake of consistency. [WG1 TSU (Reviewer's comment ID #: 285-2)]	Noted: consistency has been a concern thoughout the process
1-527	A	41:48	41:49	It should be made clear that the greenhouse effect of clouds is really proportional to the temperature contrast between the ground surface temperature and the cloud top temperature. Thus, a low cloud near the ground will have a small greenhouse effect, while a high cirrus cloud will have a large greenhouse effect. [Andrew Lacis (Reviewer's comment ID #: 138-4)]	Rejected. This is too complex for such a text.
1-528	A	41:48		Since major feedbacks involving clouds have yet to be clearly identified using the observational record, I suggest adding "potentially" before "major feedback mechanism is that of clouds. 21 1-21 21 [Richard Allan (Reviewer's comment ID #: 3-4)]	Noted. Nor taken into for lack of space
1-529	A	41:49	41:50	: it might be appropriate to add mention that the absorption of infrared by clouds is a 24-	Noted. Not taken into account due to

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				hour process, while the effects of clouds on absorbed solar radiation depends on the incoming solar radiation as a function of latitude, season, and hour. This ties in with discussion of changes of diurnal temperature range in later chapters. [Govt. of France (Reviewer's comment ID #: 2010-21)]	the additional complexity brought by the suggestion.
1-530	A	41:49	41:50	It might be appropriate to add mention that absorption of infrared by clouds is a 24-hour process, while the effects of clouds on absorbed solar radiation depends on incoming solar radiation as a function of latitude, season, and hour. This ties in with discussion of changes of diurnal temperature range in later chapters. [Robert Kandel (Reviewer's comment ID #: 123-16)]	Idem
1-531	A	43:0		Figure 1.1: What does the brown/greyish curve show? [Jón Egill Kristjánsson (Reviewer's comment ID #: 136-18)]	Accepted. The new figure has brackets at the end which clearly shows which colors refer to which projections and clarifies the overlaps which is the subject of the reviewer's comments.
1-532	A	43:5	43:5	This diagram is misleading. The main feature of the temperature record was the large El Niño eventof 1998. Surely you are not arguing that the "projections" were intended to take this in?. Withouit it the fit is poor; but you do not present the satellite or radiosonde records for the same period, even though they are more appropriate, as they are for the regionn where the greenhouse effect is supposed to happen. The reason you do not do so is that they would show the "projections" to be completely wrong. [VINCENT GRAY (Reviewer's comment ID #: 88-106)]	Rejected. First off the El Niño is a real climate event that is part of the record. It can not be ignored. The recent annual temperatures are right up near the smoothed time series and the recent annual temperatures are not impacted by the El Niño. For that matter, neither is the 2005 smoothed time series. Regarding radiosondes or satellite data, as later chapters should indicate, whether the surface is warming more than the lower troposphere depends on which data set one uses as cold biases have recently been discovered in daytime radiosondes and in the diurnal drift adjustment for one of the satellite data sets. But the real reason the surface temperature is shown is because that is where we live and grow our food. Ergo, surface projections are of far more interest than upper air projections.
1-533	A	43:7	43:7	Remove the extra "Figure 1.1" from this line.	Accepted.

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				[David Parker (Reviewer's comment ID #: 195-56)]	
1-534	A	43:9	43:9	The 13-point filter used in Chapter 3 is not binomial: see page 3-116 lines 24-29. [David Parker (Reviewer's comment ID #: 195-57)]	Accepted. The correct filter has been used and described.
1-535	A	44:0		Figure 1.2. Notwithstanding Section 1.5.2, maybe try to convey advances in the treatment of clouds (without making the pictures too complex). [David Parker (Reviewer's comment ID #: 195-58)]	We seriously considered making a change along the line suggested by the reviewer but it was beyond our ability to express the changes in model treatment of clouds simply and yet accurately in a cartoon illustration fashion as there have been so many different types of changes in how models handle clouds. So this suggestion was rejected.
1-536	A	44:0		Figure 1.2 is much improved from the first-order draft, yet still hard to interpret. Could some more text explaining the evolution be inserted? Also note what else is lacking in the models. Figure 1.2 either needs to be dramatically improved or deleted. [Govt. of United States of America (Reviewer's comment ID #: 2023-45)]	Accepted and rejected. Text has been added to the figure to identify each added complexity in the model.
1-537	A	44:0		Along with the increasing complexity, could an assessment of improvements in uncertainty be included in Figure 1.2? [Govt. of United States of America (Reviewer's comment ID #: 2023-46)]	Rejected. The uncertainty of historical models is not known well enough to portray.
1-538	A	44:2	44:7	It would be useful to add some more text in this GOOD figure. The figure might be used for educational purposes and would thus need more clarifications. The new text could also be put in the corresponding text, but better in the figure itself? [Govt. of Finland (Reviewer's comment ID #: 2009-9)]	Accepted.
1-539	A	44:5	44:5	Figure 1-2 is also misleading. It gives the impression that the models include "projections" of solar activity and urban heating [VINCENT GRAY (Reviewer's comment ID #: 88-107)]	Rejected. Solar radiation is in the models. Historical solar radiation changes are used in modeling past climates. There is no city in the figure, just industry producing CO2 and sulphates, so the figure does not imply that all urban effects are incorporated.
1-540	A	45:0		Figure 1.3. Make a few of the lines dashed or dotted to make them more distinguishable. [David Parker (Reviewer's comment ID #: 195-61)]	Accepted.
1-541	A	45:5	45:5	1-3 is also misleading as it does not indicate the upwards bias due to proximioty of the observations to human habitation. [VINCENT GRAY (Reviewer's comment ID #: 88-108)]	Rejected. The potential urban influence and how it is dealt with in the different time series is clearly described in the

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					text associated with the figure.
1-542	A	45:10	45:10	The 13-point filter used in Chapter 3 is not binomial: see page 3-116 lines 24-29. [David Parker (Reviewer's comment ID #: 195-59)]	Accepted. The correct filter has been used and described.
1-543	A	45:12	45:12	Change "to" to "from". [David Parker (Reviewer's comment ID #: 195-60)]	Accepted.
1-544	A	46:5	46:5	1-4 looks pretty but means little. You are now presenting what is going to happen in 2007. So much for "history" [VINCENT GRAY (Reviewer's comment ID #: 88-109)]	Rejected. This figure just puts the current in historical perspective.
1-545	A	47:0		Comment Question 1.1, Figure 1 The labeling inside the figure should read: Reflected by Clouds, Aersols, and Atmospheric Gases [Wilmer Anderson (Reviewer's comment ID #: 5-15)]	Accepted.
1-546	A	47:5		Suggest expanding figure caption to describe figure to those readers that haven't read the main text. [David Wratt & David Fahey (Reviewer's comment ID #: 67-6)]	Accepted.
1-547	A	48:0		Figure "Question 1.2, Figure 1": For the text box "Cryosphere" the components "Snow" and "Frozen ground" should be added to text. [Ketil Isaksen (Reviewer's comment ID #: 115-15)]	Accepted.
1-548	A	48:0		Question 1.2, Figure 1. Change "Cryosphere" to "Changes in the cryosphere" to be consistent with other legends. [David Parker (Reviewer's comment ID #: 195-62)]	Accepted.
1-549	A	49:0		Question 1.3, Figure 1: The sun is horrible and the black of spce rather depressing! I suggest a simpler sun graphic (e.g. Question 1.2 Figure 1) and reduce/remove the black area. [Richard Allan (Reviewer's comment ID #: 3-23)]	Accepted.
1-550	A	49:0		Note on Question1.3, Figure 1 It might be helpful to explain that although the redirected light from a single molecule can be emitted in any direction, a thick opaque layer of greenhouse gases results in more back long-wavelength radiation than long-wavelength radiation into space because the bottom of the layer is hotter than the top of the layer. Otherwise non-scientists may find the discussion confusing. Also a reference to Question 1.1, Figure 1 gives the ratio of the back radiation to the radiation into space. [Wilmer Anderson (Reviewer's comment ID #: 5-27)]	Rejected. This is too complex to add for the figure as the figure text has been simplified, but is appropriate to include in the text of the section.
1-551	A	49:0		Question 1.3, Figure 1: The text "Most radiation is absorbed by the Earth's surface and warms it"+H31 is ambiguous. In fact only about 50% of the solar radiation that impinges at TOA is absorbed by the Earth's surface. Also, it is not quite clear whether 'radiation' here means 'solar radiation' or not. [Jón Egill Kristjánsson (Reviewer's comment ID #: 136-19)]	Accepted, the wording has been changed.

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1-552	A	49:0		Question 1.3, Figure 1: The text "Solar radiation passes through the clear atmosphere" is misleading, because 20% of the solar radiation that impinges at the TOA is absorbed in the atmosphere, mainly by water vapour, ozone and clouds. [Jón Egill Kristjánsson (Reviewer's comment ID #: 136-20)]	Accepted, the wording has been changed.
1-553	A	49:0		Question 1.3, Figure 1: The text "Some of the infrared radiation ……" is somewhat misleading. Since only about 10% of the infrared radiation emitted from the surface, passes through the whole atmosphere, it would be better to replace "and some is absorbed" by "while most is absorbed". Also, shouldn't aerosols be mentioned, even though their longwave effect is believed to be rather small? [Jón Egill Kristjánsson (Reviewer's comment ID #: 136-21)]	Accepted, the wording has been changed.
1-554	A	111:19	111:20	"All of the increases are all attributable to human activities." Is this too strongly stated? [Melinda Marquis (Reviewer's comment ID #: 162-64)]	Misplaced.